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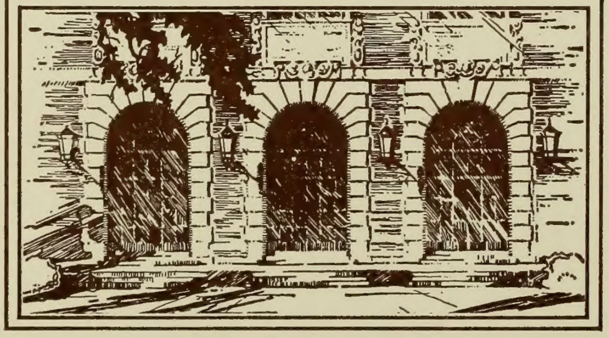

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NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

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Preface

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from virtually every medical journal published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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NOTE

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Gr.	Greek	Pol.	Polish
Ar.	Arabic	Heb.	Hebrew	Por.	Portuguese
Bul.	Bulgarian	Hun.	Hungarian	Rum.	Rumanian
Ch.	Chinese	Ic.	Icelandic	Rus.	Russian
Cz.	Czech	In.	Indonesian	Ser.	Serbo-Croatian
Dan.	Danish	It.	Italian	Sl.	Slovene
Dut.	Dutch	Jap.	Japanese	Sp.	Spanish
E.	English	Kor.	Korean	Sw.	Swedish
Eston.	Estonian	Latv.	Latvian	Th.	Thai
Fin.	Finnish	Lith.	Lithuanian	Turk.	Turkish
Fr.	French	Maced.	Macedonian	Uk.	Ukrainian
Ger.	German	Nor.	Norwegian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	µM	micromolar
admin.	administered, administration	max.	maximum, maximal
ADP	adenosine diphosphate	mc,µc	milli-, microcurie(s)
ATP	adenosine triphosphate	mg	milligram(s)
approx.	approximately	min.	minute(s)
av.	average(d)	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
°C	degrees centigrade	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
CNS	central nervous system	ng	nanogram (10-9)
conc.	concentrate(d), concentration(s)	pg	picogram (10-12)
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes)
µg	microgram(s)	resp.	respectively
hr.	hour(s)	Rev.	review (only in cite)
i.m.	intramuscular	RNA	ribonucleic acid
inj.	injected, injection(s)	s.c.	subcutaneous
i.p.	intraperitoneal	sec.	second(s)
i.U.	international unit(s)	SGOT	serum glutamic-oxalacetic transamin
i.v.	intravenous	SGPT	serum glutamic-pyruvic transaminase
kg	kilogram(s)	soln.	solution(s)
LD_{50}	median lethal dose(s)	U	unit(s)
LDH	lactic acid dehydrogenase	UV	ultraviolet
m	meter(s)	vol.	volume
M	molar	WBC	white blood cells (leukocytes) or count
mEq	milliequivalent(s)	wk.	week(s)
mM	millimolar	wt.	weight(s)

yr. year(s)

GENERAL

5628 EFFECTS OF CATIONS ON ILEAL COMPLIANCE AND BLOOD FLOW. (E.) Dabney, J. M. (Michigan State U., East Lansing), J. B. Scott and C. C. Chou. Amer. J. Physiol. 212(4): 835-839, 1967.

The action of a local intra-arterial infusion of KCl, $MgCl_2$ and $CaCl_2$ on vascular resistance and intestinal wall compliance was studied in ileal segments of the anesthetized dog. With collateral flow excluded, either venous outflow was measured or arterial inflow was controlled with a pump. Intestinal compliance (compliance defined as Δ lumen vol./Δ lumen pressure) was studied only in the pump-perfused experiments by distending the ileal lumen and recording the pressure developed. In experiments measuring venous outflow, Mg increased, K had a biphasic action and the action of Ca on flow was irregular but, on the av., not significant. K alone significantly affected lumen pressure. Study of intestinal compliance during infusion of these ions showed that Ca and Mg increased compliance, but K had a biphasic action depending upon the rate of infusion. These results support the theory that the total effect of these cations on intestinal vascular resistance is mediated through their action on both vascular and intestinal smooth muscle.

5629 STUDIES ON INTESTINAL CIRCULATION. (E.) Wallentin, I. (U. Goteborg, Sweden). Acta Physiol. Scand. 69(Suppl. 279): 1-38, 1966.

The intestinal vascular bed in cats was studied during a max. range of induced changes in vascular tone produced either by pharmacological agents or by stimulation of sympathetic vasoconstrictor fibers. Resting blood flow in denervated small intestine usually ranged from 40-60 ml/(min. x 100 g) and flow could be experimentally increased to approx. 275 ml at a pressure head of 100 mm Hg. Blood flow covaried with the capillary filtration coefficient when a graded vasodilatation was induced; it was approx. 0.10-0.15 ml/(min. x 100 g) at rest and approx. 0.3-0.5 ml during max. vasodilatation. Max. blood flow of the mucosa was calculated to amount to 500 ml/(min. x 100 g) and the max. capillary filtration coefficient to approx. 1.0 ml/(min. x mm Hg x 100 g). Filtration gradually decreased and sometimes ceased within 10-15 min. when prolonged elevation of the mean capillary pressure was induced from the venous side. Prolonged stimulation of the intestinal vasoconstrictor fibers induced a specific circulatory pattern called "autoregulatory escape"; it was characterized by an initially pronounced constriction of the vascular bed followed by an escape of resistance vessels from nervous influence, usually within 1-2 min., while the perfused capillary exchange area remained reduced and the capacitance vessels maintained their constriction. When the steady state was reached during stimulation of constrictor fibers, the mean capillary pressure was normalized and usually maintained at the prestimulatory level; the pre-postcapillary resistance ratio, which increased during the initial phase of vasoconstriction, was also restored to the prestimulatory level. During the initial 1-2 min. of the poststimulatory period, the entire vascular bed dilated to a degree greater than that before stimulation. These characteristic changes in pattern of flow induced by sympathetic activity were not qualitatively different when blood flow was kept constant. The flow pattern was also mimicked when the sympathetic transmitter agent, norepinephrine, was infused intra-arterially during either constant pressure or constant flow. The characteristic changes were not induced by all vasoconstrictor agents; i.e., vasopressin, caused a sustained constriction of the resistance vessels, which was not followed by reactive hyperemia. The autoregulatory escape phenomenon also occurred when the sympathetic system was activated by stimulating the hypothalamic defense area; autoregulatory escape may be considered as a redistribution of blood flow, to some degree, from mucosa to submucosa. The regional increase in blood flow during the steady state phase of vasoconstrictor fiber stimulation was not due to the opening of true arteriovenous shunts. If preferential channels or other low resistance vessels are included in the response pattern, they must allow for diffusion exchange of solutes; therefore they cannot be regarded as true shunts. The discrepancy between blood flow and the perfused capillary surface area during constrictor fiber stimulation is apparently due to uneven perfusion, i.e., "physiological shunting".

5630 EFFECTS OF BRADYKININ, KALLIDIN, SEROTONIN AND HISTAMINE ON PANCREATIC BLOOD FLOW. (Fr.) Papp, M. (Inst. Exp. Res., Acad. Sci., Budapest, Hungary), G. B. Makara and B. Varga. Arch. Int. Pharmacodyn. 165(1): 31-36, 1967.

Low doses of bradykinin (0.1-0.6 μg/kg), kallidin (0.3 μg/kg) or serotonin (3.0 μg/kg), inj. into 1 of the pancreatic arteries, caused a sharp increase in pancreatic blood flow in dogs, probably as a result of local vasodilation. Serotonin induced a biphasic blood flow curve (a brief depression, followed by an increase to almost 200% and a slow decline), while the other 2 agents induced a briefer and sharper increase. Under these conditions arterial and portal venous pressure remained unchanged. In dogs treated with higher doses of bradykinin (0.5 or 1.0 μg/kg), kallidin (0.5 or 1.0 μg/kg) or histamine (5 or 10 μg/kg) by inj. into the thoracic aorta, a similar response was noted; serotonin (5 or 10 μg/kg) had no effect under these conditions.

5631 THE DISTRIBUTION OF SEROTONIN (5-HYDROXYTRYPTAMINE) IN THE GASTROINTESTINAL MUCOSA OF THE RAT: A COMPREHENSIVE STUDY. (E.) Thompson, J. H. (U. California Sch. Med., Los Angeles). Irish J. Med. Sci. (490):411-422, 1966.

Normal levels of gastrointestinal mucosal serotonin were determined in rats (Sprague-Dawley; Berkeley Pacific and Charles River strains) with respect to intestinal level and sex. Mucosal and comparative muscle samples were obtained from distal esophagus, stomach fundus, body and pylorus, upper and lower duodenum, mid-jejunum, terminal ileum, appendix (cecal tip), cecum, ascending, transverse and descending colon, and proximal rectum. Serotonin was assayed by extraction from total homogenates into n-butanol. In Berkeley Pacific rats, the highest mean serotonin levels were obtained in the pylorus (15.03±3.44 μg/g in 16 male and 20.57±3.21 μg/g for 11 female rats) and appendicular mucosa (14.52±4.14 μg/g in 13 male and 20.80±5.70 μg/g in 9 female rats). Male and female values for these 2 areas were significantly different for pyloric and appendicular values, resp. In the Charles River strain, no significant sex difference was observed in serotonin values, with the esophageal level reported low and varied (1.12±1.36 μg/g in 18 male rats, 2.21±1.80 μg/g in 16 female rats which probably reflected the varying density of argentaffin cells. In this strain also, mucosal serotonin levels were in the range of 0-3.7 μg/g and 0.4-2 μg/g for male and female rats, resp., and compared favorably with Berkeley Pacific rats with the pyloric and appendicular levels showing significant variance (differences in appendicular levels in male rats, pyloric and appendicular levels in female rats corresponded to probability values of $p < 0.001$, $p < 0.01$ and $p < 0.001$, resp.). No correlation between serotonin levels and rat wt. was observed. No measurable levels of serotonin were obtained from the muscle samples, indicating that removal of mucosa by scraping leaves negligible quantities of serotonin in subjacent muscle.

5632 IMPROVED ISOLATION OF ANAEROBIC BACTERIA FROM THE MOUSE CECUM BY MAINTAINING CONTINUOUS STRICT ANAEROBIOSIS. (E.) Spears, R. W. (Jefferson Med. Coll., Philadelphia, Pa.) and R. Freter. Proc. Soc. Exp. Biol. Med. 124(3):903-909, 1967.

Two technics for anaerobic culture were compared for their efficiency in isolating anaerobic bacteria from the mouse cecum. A conventional method, using a broth diluent and blood agar plates incubated in anaerobic jars, recovered only 1.1-5.8% of the total number of bacteria present. In contrast, 19.7-33.7% of the total bacterial count was recovered when the specimen was processed by the Hungate technic; the latter entailed anaerobic collection, dilution in reduced fluid under CO_2 and culture in roll tubes. Many bacteria isolated in this manner did not grow at all on blood agar plates incubated in anaerobic jars. The data presented suggest tha the predominant, strictly anaerobic bacteria of the cecal flora were sensitive to even transien contact with atmospheric O_2.

5633 THE DISTRIBUTION OF Cl. perfringens I THE INTESTINAL CONTENTS OF HEALTHY PERSONS. (Rus.) Sidorenko, G. I. (Pirogov 2nd Med. Inst., Moscow) and E. B. Borovik. Gig. Sanit. 31(10):29-33, 1966.

Feces samples collected from 1274 healthy individuals of various ages were examined for the presence of Clostridium perfringens. The incidence of positive isolations increased with increasing age, being 6.2 and 78.6% in samples collected from newborns and individuals older than 61, resp. A similar relationship was found between the conc. of Cl. perfringens in positive samples and the age of individuals. Of the 912 strains isolated 475 were nontoxic for white mice, whereas 437 were slightly toxic strains of type A of which 185 strains (20.4%) had a toxicity of 2-30 MLD per ml. Strains having spores resistant to heating were not isolated from feces of newborns, but they occurred frequently in samples collected from other groups. It was shown that Cl. perfringens infecting the intestinal tract of newborns may come from contaminated skin (hands, breast) or dust. Working conditions may also affect the incidence of Cl. perfringens in the intestinal tract of adults. The percentage of positive isolations from feces samples collected from personnel of subway stations was higher (98%) than that of samples taken from personnel working on the ground in a factory illuminated with artificial light (68%).

5634 POSTNATAL CHANGES IN PHOSPHATASE AND NONSPECIFIC ESTERASE ACTIVITY IN THE LARGE INTESTINE OF THE RAT. (E.) Masnerova, M. (Charles U., Prague, Czechoslovakia), O. Koldovsky and K. Kubat. Experientia 22(8):518-519, 1966.

Rats aged 1,3,7,10,15 and 20 days and adult animals were examined histochemically. Each age group contained 5 rats; sexes were about equal. Rats were decapitated 3 hr. after deprivation of food. Excisions of the cecum and the middle part of the oral and aboral half of the large intestine were fixed in Baker's formol-calcium at 4°C for 24 hr. and alkaline and acid phosphatases were determined in paraffi sections together with nonspecific and α-esterase In general, the alkaline phosphatase could be demonstrated in the brush border, apical and supranuclear Golgi zone of enterocytes, in the endothelium of some small vessels and capillaries in eosinophils, neutrophils, some macrophages and reticular cells of lymphadenoid tissue. The acid phosphatase is located in the same regions with the exception of the endothelium. Nonspecific-esterase is positive in the form of fine granules in the apical parts of the enterocytes in the Golgi zone; less fine granules to an intense diffuse reaction mark the basal parts of the enterocytes in the gland crypts. Eosinophils, neutrophils, macrophages, fibrocytes and probably some mast cells are also positive. A slightly positive nonspecific-esterase reaction was also found in smooth muscle cells of both muscular layers and the myenteric plexus. α-Esterase shows a less pronounced reaction in the same locations but cannot be demonstrated in the mast cells. The strength of these enzymes varies in different regions of the large intestine and from animal to animal. The activities of the 2 esterases are found in the cells on the first day and activity increases from the 20th day. Activity is highest in the adult. Enterocytes of the aboral part of the large intestine are also positive in contrast to the phosphatases.

5635 METABOLISM OF HISTAMINE-^{14}C IN NORMAL GUINEA PIGS OR AFTER PROLONGED HISTAMINE TREATMENT.

(Fr.) Andrzejewski, S. W. (Fac. Pharm., Paris, France) and Y. Cohen. C. R. Soc. Biol. (Paris) 161(10):1810-1814, 1966.

In guinea pigs treated with glucose soln. (1 ml/kg/day for 8-10 wk.), followed by a single inj. of ^{14}C-histamine (120 μg = 20 μc/kg i.v.), total radioactivity in the liver, ileum and stomach 15 min. later was 151.31, 74.53 and 63.54 nc/g tissue, resp. In the liver and ileum, most of this radioactivity was in the form of acid metabolites (148.24 and 66.13 nc/g, resp.), with trace quantities as unchanged histamine or methylhistamine. In the stomach, a larger proportion of the dose was found in the latter 2 forms (av. 13.68 and 27.75 nc/g, resp.). In guinea pigs treated for 8-10 wk. with unlabeled histamine (doses not stated), there was no significant change in label distribution in the liver, ileum or stomach, although a significant increase in acid metabolites at the expense of methylhistamine was noted in the kidneys and plasma.

5636 NITROGEN MUSTARD HYPERAMYLASEMIA AND INTESTINAL LESIONS.

(E.) Hiatt, N. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.), N. E. Warner, G. Furman and M. Merchey. Surgery 61(4):596-601, 1967.

Mongrel dogs (40) were divided into 3 groups. In Group 1, 24 intact dogs were given an i.v. inj. of nitrogen mustard (1.5 mg/kg); 18 were then maintained (on nitrogen mustard) p.o., and 6 parenterally. In Group 2, 12 pancreatectomized dogs were given nitrogen mustard i.v., 6 immediately after the operation and 6 from 2 days-2 mo. after the operation; 6 were maintained p.o., and 6 parenterally. In Group 3, 4 dogs with well-healed Thiry-Vella fistulas of a 15-cm segment of the jejunum were given an i.v. inj. of nitrogen mustard and were subsequently maintained p.o. With the LD_{80} dose of nitrogen mustard, most of the dogs had diarrhea and anorexia within 2 days, and all animals lived at least 3 days; in 8 dogs the experiment was terminated on day 3. Of the remaining 32 dogs, 6 (19%) survived 10 days or longer. None of the others survived the fifth day, and nonsurvivors included all of the pancreatectomized dogs. In 14 dogs of Group 1, there was a sharp rise in the level of serum amylase on the second or third day, with a rapid return to the preinj. level in survivors; there was no apparent relation between the type of postinj. maintenance and the amylase response to nitrogen mustard. None of the dogs in Group 2 showed a significant change in the level of serum amylase after i.v. inj. of nitrogen mustard. In 3 animals in Group 3, there was a significant rise of serum amylase on the third day. Microscopically, the pancreas appeared to be normal in all of the intact dogs and in those with Thiry-Vella fistulas. In intact dogs, small intestine and lymph nodes showed typical changes associated with nitrogen mustard inj.; in pancreatectomized dogs, intestinal tract and mesenteric node lesions were less severe than those in intact dogs. The mustard lesions in dogs with Thiry-Vella fistulas were less severe than those of the small intestine in continuity of the same animal. The results of this study suggest that the small intestinal content, particularly the pancreatic juice, plays an important role in the development of nitrogen mustard lesions of the intestine.

5637 COLORIMETRIC METHOD OF MEASURING ELASTOLYTIC ACTIVITY IN EXTRACTS OF WHOLE PANCREATIC TISSUE.

(E.) Geokas, M. C. (U. Southern California Sch. Med., Los Angeles), S. Eisenstein, R. D. McKenna and I. T. Beck. J. Lab. Clin. Med. 69(3):530-536, 1967.

A colorimetric assay for elastase activity is reported; it is based on solubilization of an elastin-orcein substrate. The method has been adapted for quantitative determinations of free elastase and proelastase in whole extracts of normal and necrotic pancreatic tissue. An elastase unit was defined as that amount of enzyme which will render soluble 1 mg elastin-orcein substrate in 30 min. (between 10 and 40 min. reaction times) at 37°C in Tris buffer. A restricted set of conditions was formulated, including use of the 10-40 min. assay and a 5% dilution of whole pancreatic extract (containing both elastase components) on finely ground alkali-treated elastin in Tris buffer. Whereas linear elastolysis time curves were obtained when up to 64% of a 25 mg elastin-orcein substrate was rendered soluble, color interference and the slow initial phase of the reaction were nullified by use of the 30-min. assay. This method facilitates quantitative determinations of elastase and its zymogen in whole pancreatic extracts, and it is therefore suitable for studies of elastase activity in pancreatitis.

5638 REUTILIZATION OF DNA BREAKDOWN PRODUCTS FROM LYMPHOCYTES IN LUMEN OF INTESTINE. (E.) Kotani, M. (Kyoto U., Japan), A. Yamashita, F. Rai, K. Seiki and I. Horii. *Blood* 29(4): 616-627, 1967.

The migration of a large number of lymphocytes (211.8 x 10^6/day) into the intestinal canal of young male Wistar rats (100 g body wt.) was observed. In the intestinal lumen, approx. 80.2% of the lymphocytes were small, 15.9% were medium-sized and 3.9% were large. No recycling of the instilled cells into the intestine was noted. Lymphocytes labeled with ^{3}H-thymidine, obtained both from the thymus and mesenteric lymph nodes of donor rats, were washed and inj. into the intestine of recipient rats. ^{3}H-activity of the blood and thoracic duct lymph plasma after admin. of labeled lymphocytes revealed that DNA breakdown products from intestinal lymphocytes were absorbed and transferred through both the portal vein and the thoracic duct. Autoradiography showed that the activity was actually incorporated into the DNA of proliferating cells of the recipient.

5639 THE INTESTINAL RESPONSE TO HIGH BULK FEEDING IN THE RAT. (E.) Dowling, R. H. (Postgrad. Med. Sch., London), E. O. Riecken, J. W. Lawa and C. C. Booth. *Clin. Sci.* 32(1):1-9, 1967.

Rats were fed diets containing 66% (1:2 Group--diet containing 1 part by wt. of standard diet and 2 parts of powdered kaolin) and 80% (1:4 Group--diet containing 1 part of standard diet and 4 parts of powdered kaolin) by wt. of powdered kaolin for 9 mo. in order to assess the effect of increased dietary bulk on the intestinal tract. In addition, the functional response of the small intestine to this regimen was determined by measuring glucose transport using the everted sac technic. The anatomy of the intestine was studied radiologically in life and subsequently at autopsy. Rats whose diet was diluted with kaolin grew less well than controls, in spite of a marked increase in the wt. of the diet consumed; there was a corresponding increase in stool wt. as a result of the excretion of unabsorbed kaolin. There was no difference in the wt. of the stomach from the 3 dietary groups. Mean wt. of the small intestine of controls was 5.04 g (range 2.81-7.34) and there was no significant difference in small intestinal wt. in the bulk-fed animals. There was a marked increase in wt. of the cecum and colon in both groups of bulk-fed rats; whereas the mean colon wt. in the controls was 2.81 g (range 2.0-3.45 g), it was 3.79 g (range 3.05-4.29 g) in rats given the 1:2 diet and 4.09 g (range 2.85-6.09 g) in the 1:4 diet grou This increase was predominantly due to an increase in thickness of the muscle coat; this increase had developed within 3 wk. in rats fed either the 1:2 or 1:4 diet. Ba studies of the gastrointestinal tract in life showed no dilatation or hypertrophy of the small intestine but there was radiological dilatation of the cecum in bulk-fed rats and the wt. of the large intestine was significantly greater than in controls. After bulk feeding, the jejunum showed a marked increase in absorptive capacity of glucose and water. The mean glucose transport by control rats was 2.52 mg/100 mg dried intestinal tissue, whereas it was 4.81 mg by the 1:2 group and 9.96 mg by the 1:4 group. The difference in glucose transport between both bulk-fed groups was statistically significant, and that between controls and 1:4 kaolin-fed rats was highly significant. The vol. of net serosal fluid transfer for controls was 0.10 ml/100 mg dry wt. intestine, compared with 0.25 ml in the 1:2 group and 0.63 ml by the 1:4 group The histochemical enzyme pattern of small intestinal mucosa in bulk-fed rats showed an increase in the activity of leucine aminopeptida and to a lesser degree, an increase in glutamate and alcohol dehydrogenases when compared with the mucosa from control rats.

5640 COMPARISON BY RADIOGRAPHY AND MICRODENSITOMETRY OF EVACUATION OF THE GALLBLADDER IN A TELEOST (*Cyprinus carpio* L.) AND IN MAN. (Fr.) Toye-Lazarin, P. (Hotel-Dieu, Toulouse, France), G. Broussy and C. Laporte. *Rev. Canad. Biol.* 26(1):17-21, 1967.

5641 MODIFICATIONS OF THE EXOCRINE PANCREAS OF THE HEDGEHOG (ERINACEUS EUROPAEUS) DURING HIBERNATION. (It.) Bani Sacchi, T. (U. Florence, Italy). *Boll. Soc. Ital. Biol. Sper.* 42(22):1566-1568, 1966.

5642 MODIFICATIONS IN THE EXOCRINE PANCREAS OF THE ALBINO RAT DURING PROFOUND GENERAL HYPOTHERMIA. (It.) Bani Sacchi, T. (U. Florence, Italy) and A. Bolletti. *Boll. Soc. Ital. Biol. Sper.* 42(22):1565-1566, 1966.

5643 EFFECT OF THYROID EXTRACT AND PROPYLTHIOURAÇIL ON SALIVARY GLAND OF ALBINO RAT. (It.) Modica, R. (U. Turin, Italy) and F. Mongini. *Minerva Stomat.* 16(1):21-23, 1967.

644 UPTAKE AND SCANNING OF THE SALIVARY GLANDS IN MAN USING PERTECHNETATE-
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5646 INORGANIC IONS IN CECAL CONTENT OF GNOTOBIOTIC RATS. (E.) Asano, T. (U. Notre Dame, Ind.). Proc. Soc. Exp. Biol. Med. 124(2):424-430, 1967.

5647 THE COMMON BILE DUCT IN MAN: ITS DIAMETER AND CIRCUMFERENCE. (E.) Mahour, G. H. (Mayo Clin., Rochester, Minn.), D. G. Wakim and D. O. Ferris. Ann. Surg. 165(3): 415-419, 1967.

Autopsy studies were made on 100 selected subjects whose ages ranged from 15-102 yr. and who had intact biliary tracts. Outer diameters and inner circumferences of the ducts av. 7.39 and 14.99 mm, resp. Correlations between caliber variations of the duct and age of the subject demonstrated a definite increase of both outer diameter and inner circumference with age in both men and women. No relationship between caliber variations and body length or body wt. was observed.

5648 ELECTRON MICROSCOPIC ASPECTS OF HEPATIC INTRACELLULAR COMMUNICATIONS. (Rum.) Pavel, I. (Dr. J. Cantacuzino Hosp., Bucharest, Rumania), S. Campeanu, H. Bonaparte, A. Petrovici and M. Stoian. Stud. Cercet. Med. Intern. 7(5):457-460, 1966.

From the electron microscope findings illustrated, it is concluded that there are intracellular communications of sinusoid aspect connecting Disse's space with the biliary canaliculi, which, at certain points, exhibit zones of coalescence (so-called impermeable junctions) intermediate or adherent (desmosomes), but do not interrupt this connection. These intracellular spaces may, on occasion, become visible routes of communication, and the fact that they have been declared impermeable by some authors is due only to their having been observed in periods of functional rest. That they are more conspicuous in certain pathologic states does not testify to their pathologic significance, but merely reflects certain pre-existing and current morphologic aspects which remain to be defined.

5649 VARIATION OF THE ARTERIES SUPPLYING THE LIVER IN MAN. (Pol.) Nowak, M. (Inst. Norm. Anat., Warsaw). Folia Morph. (Warsz.) 25(3):277-284, 1966.

The variability of hepatic arterial vascularization was studied on 110 cadavers (87 male, 23 female; age varied from 53-74 yr.). The vessels emanating from the branch of the splanchnic trunk and upper mesenteric arteries were considered. Six forms of hepatic vascularizations were recognized, depending on the number and the starting site of the arterial branches reaching the liver. In the first form (56.4% of the cases), the liver was supplied by the hepatic artery alone. In the second form (1.8%), the hepatic artery was missing; the liver received right and left hepatic arteries from the gastroduodenal artery. In the third form (28.2%), the liver was vascularized by the hepatic artery and left supplementary hepatic artery. In the fourth form (9.1%), the liver was supplied by the hepatic artery and the right supplementary hepatic artery. In fifth form (3.6%), the live was supplied by the hepatic artery and left and right supplementary hepatic artery. In the sixth form (0.9%), the liver was vascularized b the hepatic artery, 2 left supplementary hepati arteries and 1 right supplementary hepatic artery.

5650 AN ELECTRON MICROSCOPIC STUDY OF THE EPITHELIUM OF NORMAL HUMAN SIGMOID COLONIC MUCOSA. (E.) Pittman, F. E. (Queen Elizabeth Hosp., Birmingham, England) and J. C. Pittman. Gut 7(6):644-661, 1966.

Early undifferentiated cells and goblet cells were observed at the base of the crypts in the 17 subjects studied. Examination of goblet cells showed the presence of cytoplasmic alpha-cytomembranes; granules, mitochondria and vesicles in the cytoplasm of more matured cells mucin droplets arising from 'stacked' membranes of the supranuclear Golgi apparatus; a spherica unit structure of mucin droplets at high power; interdigitation of lateral membranes; a basilar membrane composed of electron dense spherical units overlying a layer of filamentous material perinuclear cisterna perhaps permitting free exchange of cytoplasm and nucleoplasm. Inspection of chief cells showed the limiting membrane of the microvilli to be composed of spherical units and filamentous material. Filaments were seen to extend from the entire microvillar surface with round structures observable in the microvillar border, probably resulting from microvillar degeneration. A network of filaments (approx. 0.25 μ) was seen beneath the basement membrane of chief cells. Argentaffin cells were observed occasionally in the base of the crypts and were characterized by cytoplasmic electron dense bodies.

5651 STUDIES ON THE "OSMIUM ZINC IODIDE-AFFIN" ELEMENTS OF THE SUBMANDIBULAR GLAND. (Ger.) Booz, K. H. (U. Saarlandes, Homburg/Saar, Germany), W. Mootz and K. Müsebeck Jahr. Morph. Mikro. Anat. 75(4):474-481, 1966.

5652 CILIUM-LIKE STRUCTURES FOUND BY ELECTRON MICROSCOPY IN THE GLANDULAR AND THE SMALL DUCTAL LUMINA OF THE TOAD PANCREAS (E.) Kobayashi, K. (U. Gunma Sch. Med., Maebashi, Japan). Nippon Soshikigaku Kiroku (Arch. Histol. Jap.) 28(1):9-21, 1967.

5653 NORMAL RADIOLOGIC PATTERN OF THE TERMINAL ILEUM IN CHILDREN. (Pol.) Radelicka-Rajszys, H. (Radiol. Pediat. Clin., Warsaw) and A. Marciński. Pol. Przegl. Radiol. 31(2):249-255, 1967.

5654 ACID MUCOSUBSTANCE AND BASIC PROTEIN IN MOUSE PANETH CELLS. (E.) Spicer, S. S. (NIH, Bethesda, Md.), M. W. Staley, M. G. Wetzel and B. K. Wetzel. J. Histochem. Cytochem. 15(4):225-242, 1967.

5655 CONCOMITANT HISTOCHEMICAL DEMONSTRATION OF HISTAMINE AND CATECHOAMINES IN ENTEROCHROMAFFIN-LIKE CELLS OF GASTRIC MUCOSA. (E.) Håkanson, R. (U. Lund, Sweden) and C. Owman. Life Sci. 6(7):759-766, 1967.

See also abstract nos.: 5988,5997,6344

5656 RELATIONSHIPS BETWEEN INTESTINAL ABSORPTION OF ACTIVELY TRANSPORTED OR DIFFUSING SUBSTANCES AND CONCENTRATION OR TRANSPORT OF Na$^+$. (Ger.) Lauterbach, F. (Madaus Inst., Cologne-Merheim, Germany). Biochim. Biophys. Acta 135(2):256-272, 1967.

The influence of Na conc. and Na transport on enteric absorption of either actively transported or diffusing substances was studied by perfusion of guinea pig and rat small intestine in vitro, according to the method of Fisher and Parsons. Na conc. of the perfusing soln. was varied by isotonic exchange of NaCl with mannitol. Two relationships were found which correlated Na and glucose absorption: 1) there was a strong linear correlation between Na absorption and glucose if Na conc. was held constant; and 2) the regression coefficient decreased with increasing Na conc. of the perfusing soln.; therefore, the ratio of the absorbed amounts:glucose/Na decreased with increased supply of Na. The same relationships were true for the absorption of K and Ca. A proportionate rise in Na absorption occurred with increasing levels of Na in the perfusing fluid; simultaneously, the mean absorption of K, Ca and glucose increased and showed saturation kinetics, although their conc. was kept constant. Cortisol absorption by the perfused small intestine and urea penetration across the wall of everted intestinal sacs were both independent of the Na conc. of the perfusion and incubation media. These findings suggest that the actively transported substances, K, Ca and glucose, are each absorbed principally by the same mechanism, which functions through common transport sites. The proportional quantity of Na and other substances transported may be determined by the number of these sites, while the ratio between the mass of substance and the mass of Na transported can be determined by the particular functional character of these sites. Theoretical difficulties which arise from such a common transport site hypothesis in which Na and, e.g., glucose are assumed to be complexed and carried by the same active carrier are discussed.

5657 EFFECT OF DIETARY PROTEIN DEFICIENCY ON INTESTINAL ABSORPTION AND TISSUE DISTRIBUTION OF ABSORBED ^{59}Fe IN MALE RATS. EFFECT OF ERYTHROPOIETIN INJECTIONS. (Fr.) Aschkenasy, A. (Hemat. & Endocrin. Lab., Montrouge, Seine, France). Rev. Franc. Etud. Clin. Biol. 11(10):1010-1022, 1966.

In rats fed a protein-deficient diet for 7 days, ^{59}Fe absorption (0.2-0.4 mc p.o.) was nearly normal (mean 24.6%), but RBC utilization of absorbed iron was almost completely suppressed (mean 0.10%). After 7 wk. of nitrogen starvation, iron absorption fell to 10.2%, but RBC utilization of absorbed iron increased (mean 1.87%; normal 7.32%). Treatment with erythropoietin-rich plasma at the beginning of nitrogen starvation enhanced utilization of absorbed iron (2.47%) without increasing iron absorption. In rats fed a balanced diet for 10 days after 7 wk. of nitrogen starvation, iron absorption and RBC incorporation of absorbed iron markedly increased. In rats on normal and low-protein diets, ^{59}Fe absorption was much higher after i.v. than p.o. admin., but after 1 wk. of protein deprivation i.v. ^{59}Fe accumulate in the liver to a much greater extent than absorbed iron. Retention of label in the intestinal wall was markedly increased by protein deficiency.

5658 COMPARATIVE EFFECTS OF CASEIN AND DIFFERENT AMINO ACID MIXTURES ON INTESTINAL ABSORPTION OF ^{59}Fe AND ERYTHROPOIETI UTILIZATION OF ABSORBED RADIOIRON IN PROTEIN-DEFICIENT RATS. (Fr.) Aschkenasy, A. (Lab. Hematol. Endocr., C.N.R.S.-E.R. S.I., Montrouge France). C. R. Soc. Biol. (Paris) 160(7): 1383-1386, 1966.

Intestinal ^{59}Fe absorption in rats fed an 18% casein diet was 28%; after prolonged admin. of a protein-free diet it fell to 14%. When casei was restored, absorption rose to 27%; admin. of a complete amino acid mixture was even more effective (37.3%). Reticulocyte isotope uptake with the complete amino acid mixture was also stimulated, but to a lesser extent. Omission of a single essential amino acid from the mixture prohibited this stimulation of ^{59}Fe absorption during the recovery period; a deficiency of tryptophan, histidine or valine was even more injurious than a nitrogen-free diet. Erythropoietic utilization of absorbed iron was also controlled by dietary amino acids particularly histidine.

5659 THE MECHANISM OF DESQUAMATION OF CELLS FROM THE INTESTINAL VILLI (AN ELECTRON MICROSCOPE STUDY). (Ger.) David, H. (Humboldt U., Berlin). Virchow. Arch. Path. Anat. 342(1):19-25, 1967.

The epithelium of the small intestine in man in the normal state and during chronic enteritis, and also the normal and ischemic small intestinal epithelium of the rabbit were studied under the electron microscope to determine if relatively large particles, up to 100 μ, such as starch grains, gain entry to the lymphatic system and the blood in the regions of the epithelium where cells have undergone necrosis and desquamation. Under normal conditions in both man and rabbit desquamation takes place after the cellular components degenerate, with shrinkage and pyknosis of the cell; this occurs with no break in the continuity of the epithelia covering. The adjacent healthy epithelial cells press the degenerating cell out of the complex from below, simultaneously closing the area occupied by the desquamated cell. Under pathologic conditions the cells leave the epithelial layer before the space occupied by them is sealed by the adjacent cells; these breaks in the epithelium allow the passage of bacteria and particles of various sizes. Particles must pass through the barrier of the healthy epithelium by phagocytosis or possibly by being pressed into goblet cells.

5660 TISSUE CULTURE OF CALF INTESTINE. STUDY OF CELLULAR DIFFERENTIATION AND DISACCHARIDASE ACTIVITIES. (Fr.) Capdeville, Y. (Child. Hosp., Paris), J. Frézal, J. Jos, J. Rey and M. Lamy. *C. R. Acad. Sci. (Paris)* 264(3)(Ser. D):519-521, 1967.

Tissue homogenates from jejunal villi of a calf were explanted *in vitro*. The explants began to grow after about 10 days of cultivation; some died, but 1 strain became adapted to the *in vitro* conditions and had been cultivated about 4 mo. at the time of report. Fibroblasts and plaques of epithelial cells were seen throughout this time; intra- and extracellular mucopolysaccharides were found in the first 2 mo. of cultivation at least (no studies were made thereafter). The karyotype (58 acrocentrics + 2 submetacentrics) remained unchanged. Saccharase and isomaltase were absent at all times (in the original intestinal homogenate and after up to 14 passages *in vitro*); α-glucosidase activity remained unchanged, lactase fell to trace levels and maltase activity increased during *in vitro* cultivation.

5661 RESECTION OF THE SMALL INTESTINE IN RATS. I. NUTRITIONAL STATUS AND ADAPTATION OF FAT AND PROTEIN ABSORPTION. (E.) Nygaard, K. (Rikshospitalet, Oslo, Norway). *Acta Chir. Scand.* 132(6):731-742, 1966.

Resection of 25, 50, and 75% of the proximal and of the distal small intestine with end-to-end anastomosis was performed in rats. Hemoglobin levels and body wt. was determined before and various periods after operation. Fat and nitrogen balance studies were done. Distal resections affected body wt. more than proximal resections. Proximal resections up to 75% were without effect on hemoglobin levels; distal resections caused a significant reduction. Fat and nitrogen excretion were near normal 3 mo. after proximal resections of up to 75%. After distal resections excretion rose proportionally with the amount of intestine removed. Balance studies at intervals after proximal resections showed moderate malabsorption 6-12 days postoperatively and normal levels within a few mo. Following distal resections fat and nitrogen loss was large immediately following operation and had only partially adapted in 9 mo. Adaptation was slower for protein than for fat for both conditions. It is concluded that adaptation takes place rapidly after proximal resections of the small intestine, whereas adaptation is slower and incomplete after distal resections. The findings were taken to indicate that fat and protein are absorbed throughout the entire small intestine of the rat.

5662 RESECTION OF THE SMALL INTESTINE IN RATS. II. ABSORPTION OF VITAMIN B_{12}, WITH SPECIAL REGARD TO ADAPTATION OF ABSORPTION. (E.) Nygaard, K. (Rikshospitalet, Oslo, Norway). *Acta Chir. Scand.* 132(6):743-750, 1966.

Resections of the proximal 50 and 75% and of the distal 25, 50 and 75% of the small intestine with end-to-end anastomosis were carried out in rats. Absorption of ^{58}Co-labeled vitamin B_{12} was measured at various intervals after the operation. Some adaptation to the malabsorption of vitamin B_{12} was evidenced immediately following operation. The adaptation was more pronounced after proximal than after distal resections. After proximal resections rapid adaptation occurred and absorption was normal within 10 days following 50% resections; after 75% proximal resections the absorption was only partially normalized within 10 days and approached normal levels at 11 mo. After 50% distal resections adaptation was slow but approached normal levels by 6 mo. Following 75% distal resections normal levels were not reached 11 mo. after operation, although some adaptation had occurred. The patterns observed were considered similar to those reported for fat and protein absorption after resection. It is concluded that the proximal quarter of the intestine and the duodenum play a limited role in the absorption of B_{12}. The middle half of the intestine was considered the most likely place of absorption for B_{12} in the rat.

5663 EFFECT OF INTRINSIC FACTOR ON ABSORPTION OF VITAMIN B_{12} FROM SMALL INTESTINE. (E.) McColl, I. (Guy's Hosp., London S.E. 1), D. Andrews, J. C. Gazet, J. L. Raven and S. Streek. *Lancet* 1(7489):544-545, 1967.

Segments of jejunum and distal ileum were washed out during operation and isolated by clamps using previously reported methods. Soln. of normal saline containing radioactive B_{12} were inj. into 4 segments of equal area, two of jejunum and two of ileum. Hog intrinsic factor was added to one jejunum and one ileum segment. In one patient gastric juice was added instead of intrinsic factor. After 15 min. the soln. was aspirated from the segments, vol. noted and radioactivity measured in a scintillation counter. Serum B_{12} was determined by microbiological technics. Intrinsic factor had no obvious effect on the percentage absorption of B_{12}. The lowest of 3 conc. of B_{12} soln. used was less than the serum conc. Varying conc. of intrinsic factor in two patients had no effect on absorption. Gastric juice was similar in activity to hog intrinsic factor. Liver uptake of B_{12} was not affected by intrinsic factor in the 2 patients studied. The addition of Ca gluconate to the soln. in one patient did not affect absorption. It is tentatively concluded that hog intrinsic factor does not enhance absorption of B_{12} under the conditions of the experiment. Intrinsic factor may have a protective role on B_{12} absorption rather than a direct action, and possibly may have no role at all in a normal man whose intestine is free of coliform organisms competing for B_{12}.

5664 STRUCTURAL AND FUNCTIONAL CHANGES FOLLOWING SMALL INTESTINAL RESECTION IN THE RAT. (E.) Dowling, R. H. (Postgrad. Med. Sch., London) and C. C. Booth. Clin. Sci. 32(1):139-149, 1967.

Extensive resection of the proximal or distal small intestine was performed on Wistar strain rats. The histology and gross anatomy of the residual small intestine was studied at various intervals of time after surgery, and glucose absorption was measured with an *in vivo* recirculation technic. Similar studies were performed after ileo-jejunal transposition without resection. Enhanced glucose absorption and mucosal hypertrophy were noted in the intestinal remnant after extensive small intestinal resection in the rat; these compensatory changes developed in as short a period as 2 wk. after resection and were max. at 1 mo. These responses occurred to a much greater degree in the ileal remnant after proximal resection than in the jejunum after distal resection. The increased load of nutrients derived from the intestinal lumen may possibly be the stimulus to the greater hypertrophy that occurred in the ileum, since after ileo-jejunal transposition without resection the juxtaposed ileum displayed marked hypertrophy and enhanced absorption of glucose.

5665 SALT AND WATER ABSORPTION FROM THE NORMAL HUMAN COLON: EFFECT OF 9-ALPHA-FLUOROHYDROCORTISONE ADMINISTRATION. (E.) Levitan, R. (Tufts U. Med. Sch., Boston, Mass.). J. Lab. Clin. Med. 69(4):558-564, 1967.

The entire colon of 31 healthy, unanesthetized, well-hydrated subjects (29 men, 2 women; 20-65 yr. old) was perfused at a rate of 10 ml/min. by means of a perorally introduced polyvinyl tube located in the cecum. The test soln. consisted of 0.85% NaCl containing a nonabsorbable marker, polyethylene glycol (in the conc. of 0.5%). The absorption and secretion of Na, K, HCO_3, Cl and water from and into the test soln. were measured after it had traversed the colon. Unidirectional fluxes of ^3H_2O, ^{24}Na, and ^{42}K from and into the colonic lumen were also determined in several experiments. Colonic absorption from the test soln. was as follows: water, 2.11±1.5 ml/min.; Na, 0.38±0.24 mEq/min., and Cl, 0.57±0.27 mEq/min.; at the same time, K, 0.03±0.03 mEq/min., and HCO_3, 0.15±0.07 mEq/min., were added to the test soln. Unidirectional fluxes of water, Na and K were as follows: 1) water flux out, 7.38±1.6 ml/min.; flux in, 5.6±1.6 ml/min.; 2) Na flux out, 0.51±0.26 mEq/min., flux in, 0.28±0.51 mEq/min.; and 3) K flux out, 0.020±0.009 mEq/min.; flux in, 0.051±0.02 mEq/min. There was a significant increase in net absorption of Na, Cl and H_2O from the test soln. in all experiments 24 hr. after i.v. admin. of 2 mg of 9-α-fluorohydrocortisone to 5 normal subjects who were in the recumbent position and on a daily intake of 9.0 g of salt. Mean net absorption of Na for the entire study group rose from 0.46 mEq/min., to 0.71 mEq/min.; Cl rose from 0.73 mEq/min. to 0.96 mEq/min. and H_2O from 2.7 ml/min. to 4.1 ml/min. Mean H_2O flux out of the lumen was 7.82 ml/min. before and 7.58 ml/min. 24 hr. after the admin. of 9-α-fluorohydrocortisone. The calculated mean water flux into the lumen changed from 5.08 ml/min. during control studies to 3.48 ml/min. 24 hr. after hormone admin.

5666 ACTIVE SODIUM TRANSPORT BY THE COLON OF *Bufo marinus*: STIMULATION BY ALDOSTERONE AND ANTIDIURETIC HORMONE. (E.) Cofré, G. (Univ. Clin. St. Pierre, Louvain, Belgium) and J. Crabbé. J. Physiol. (London) 188(2):177-190, 1967.

Isolated colon of *Bufo marinus* transports Na actively from the mucosal (lumen) to the serosal side; this transport is expressed quantitatively by the short-circuit current. Short-circuit current remained a fair expression of Na transport from mucosa to serosa when Na was diluted in Ringer soln. on the mucosal side of the preparation. The relationship between short-circuit current and dilution of Na of the luminal side was examined and found to be curvilinear; this suggested the intervention of a saturable step in the transport of Na from lumen to serosal surface of colon. The relationship between short-circuit current and the amount of Na drawn from the luminal side and recovered in the membrane (active Na transport pool) was almost linear; this indicated that the "pump" operated far from capacity. Therefore the observed saturation of Na transport, when conc. of Na on the mucosal side was increased, probably occurred at the mucosal border of the preparation. After treatment with aldosterone, the "active Na transport pool" and short-circuit current increased to the same degree; from this it was inferred that the hormone merely allowed Na easier access to the "pump" which would react in proportion. Consequently, no direct influence of aldosterone on the "pump" proper was postulated. After exposure of the colon to antidiuretic hormone, there were modest increases of short-circuit current and of osmotic water flow across the wall of the organ.

667 FURTHER STUDIES ON INTESTINAL ACTIVE TRANSPORT DURING SEMISTARVATION. (E.) Hindmarsh, J. T. (Roy. Infirm., Sheffield, England), D. Kilby, B. Ross and G. Wiseman. J. Physiol. (London) 188(2):207-218, 1967.

The influence of semistarvation (sufficient to produce a loss of 18-28% of initial body wt.) on the active transport of D-glucose and L-histidine by the guinea pig, golden hamster and rat was studied using sacs of everted small intestine (from upper jejunum to lower ileum). In rat and guinea pig, dietary restriction produced an increased active transport in all regions of the small intestine; in contrast, it caused no alteration in active transport in the hamster. Response in the rat was most impressive in the middle-to-lower ileum during uptake of D-glucose. While normal sacs from this region were unable to move glucose against its conc. gradient, sacs from semistarved rats did this quite well. Although there was a considerable loss (24-29%) of intestinal dry wt. in all 3 species when food intake was decreased, shortening of the small intestine was not detectable in hamster or guinea-pig, and it occurred only to a minor degree in the rat. Evidence is discussed that the enhanced active transport was not merely a reflection of the thinning of the intestinal wall, and that it occurred during complete as well as in partial starvation.

5668 ABSORPTION AND METABOLISM OF UNIFORMLY ^{14}C-LABELED PHYTOL AND PHYTANIC ACID BY THE INTESTINE OF THE RAT STUDIED WITH THORACIC DUCT CANNULATION. (E.) Baxter, J. H. (NHI, NIH, Bethesda, Md.), D. Steinberg, C. E. Mize and J. Avigan. Biochim. Biophys. Acta 137(2):277-290, 1967.

Absorption (approx. 70% thru intestinal lymphatics) of tracer doses of ^{14}C-labeled phytol (0.2 mg with 1-1.5 μc) from the rat intestine was 51% (39-73%) of recovered radioactivity (91%) after a 24-hr. period. ^{14}C-labeled phytol was admin. by gastric intubation in all 5 rats, and the radioactivity measured periodically from the lymph by way of a cannulated thoracic duct, expired $^{14}CO_2$, urine and body tissues (24 or 48 hr.). When the amount of phytol admin. was increased to 300 mg, a smaller fraction was absorbed but max. absorption attained levels of 65 mg. Both phytol and cetyl alcohol were absorbed more slowly and less completely than phytanic and palmitic acids (71% and 71% resp. for the former two compared to 85% and 95% resp. for the latter, employing 0.2 mg doses in all instances) as well as less exclusively thru the intestinal lymphatics.

5669 NON-SPECIFICITY OF THE DIVALENT CATION CAPABLE OF RESTORING NORMAL INTESTINAL PERMEABILITY AFTER CHELATION DEPLETION. (E.) Goldner, A. M. (Harvard Med. Sch., Boston, Mass.), M. M. Cassidy and C. S. Tidball. Proc. Soc. Exp. Biol. Med. 124(3):884-887, 1967.

The intestine of fasted male rats was divided into 3 segments. Control and experimental segments were randomized. All soln. placed in the segments were adjusted to pH 7.0 and 30 mOsm/liter. The absorption of phenol red was used as an index of passive aqueous permeability. $BeCl_2$, $MgCl_2$, $CaCl_2$, $SrCl_2$ and $BaCl_2$ were able to restore normal aqueous permeability of the mucosal epithelial membrane following chelation depletion by Na_2H_2-ethylenediamine tetracetic acid. Each alkaline earth metal was capable of permeability reinstatement at a minimal conc. These levels of replacement were in accord with the position of the elements in the periodic table. The relationship between minimal replacement conc. and charge density appeared to indicate that a physical property of these ions was involved in the restoration of permeability rather than a specific biochemical characteristic. The particular alkaline earth metal, or combination, physiologically responsible for regulation of permeability and cell adhesion in epithelial tissue cannot be specified with any degree of certainty.

5670 THE EFFECT OF DOSE ON D-XYLOSE EXCRETION. (E.) Clark, P. A. (Barnet Gen. Hosp., Herts., England) and W. A. Harland. Amer. J. Dig. Dis. 12(2):183-188, 1967.

D-Xylose excretion tests were performed on rats following an overnight fast. Doses ranging from 0.02 to 512 mg were admin. both p.o. and i.p. dissolved in 1.6 ml of tap water. Urine was collected in glacial acetic acid for 8 hr. following dosing and the xylose content estimated. The urinary excretion of xylose following i.p. doses was remarkably constant over a wide dose range; the urinary excretion plotted against dose yielded a linear function. Following oral admin. the excretion pattern differed from the i.p. pattern. A mean excretion of 44% was observed with doses less than 24 mg but beyond this point, with doses from 32 to 512 mg, 23% of the dose was excreted. The authors conclude that the efficiency of absorption is affected by conc. of xylose in the small intestine. The reciprocal of the oral dose plotted against the reciprocal of excreted xylose yielded a straight line indicating the existence of a rate-limiting step in absorption. These findings suggest that in the rat there is a limited mechanism for facilitating the absorption of xylose. The experiments do not distinguish between the possibilities of a limited active transport mechanism, against a conc. gradient, or some mechanism of facilitated diffusion.

5671 THE EFFECT OF DIETARY CALCIUM ON THE ABSORPTION AND RETENTION OF RADIOSTRONTIUM. (E.) Nordin, B. E. C. (Gen. Infirm., Leeds, England), D. A. Smith, J. Shimmins and C. Oxby. Clin. Sci. 32(1):39-48, 1967.

The subjects were 32 patients (11 men and 21 women) under investigation in a metabolic ward for disorders of Ca metabolism. All were receiving constant diets on which they were equilibrated for 5-6 days before feces and urine collections were begun. Radiostrontium (^{85}Sr) was admin. twice daily with food in a dose of approx. 0.25 μCi as the chloride. Radioactivity in plasma, urine and feces was determined in a well-type counter. Fecal radioactivity ranged from 31.8-100.5% of the daily admin. dose and was positively correlated to the Ca intake. Urinary radioactivity ranged from 0.5-34.5% of the daily admin. dose and was negatively related to the Ca intake. Owing to the opposite effect of dietary Ca on fecal and urinary activity, Ca supplementation did not have a significant effect upon ^{85}Sr retention. When Ca supplements were given, retention fell substantially in 7 patients, but remained unchanged or rose in the remainder. The stated implication of this work for protective measures against ingested radiostrontium is that dietary supplementation would not be a useful procedure.

5672 FINE STRUCTURAL LOCALIZATION OF LYSOSOMAL ENZYMES IN THE ABSORBING CELLS OF THE DUODENAL MUCOSA OF THE MOUSE. (E.) Hugon, J. (Ctr. Study Nucl. Energy, Mol, Belgium) and M. Borgers. J. Cell. Biol. 33(1)(Pt. 1): 212-218, 1967.

BALB/c adult male mice fasted for 18 hr. were sacrificed by ether anesthesia. The duodenum was fixed in 5% cacodylate-buffered glutaraldehyde for 2 hr. at 4°C then quenched in precooled isopentane and sectioned at 30 μ. The sections were incubated in appropriate media for: acid phosphatase activity, arylsulfatase activity, E-600-resistant esterase activity and alkaline phosphatase activity. Post-fixation was in 2% OsO$_4$, embedding in Epon. The sections were examined unstained or stained with uranyl acetate-lead nitrate in a Philips electron microscope. The localization of acid phosphatase activity was mainly in the dense bodies, abundant in the apical part of the duodenal absorbing cells. Arylsulfatase activity shown by a heavy precipitate of barium sulfate localized on one side of the dense bodies. Multivesicular bodies were seldom regularly stained but frequently contained one or two vesicles with the specific precipitate. E-600-resistant esterase activity was clearly localized, particularly on nearly all the dense bodies. Alkaline phosphatase activity was localized on the microvilli, the smooth reticulum profiles, the multivesicular bodies, the Golgi cisternae and nearly all the dense bodies. The latter had the same morphological aspect as those bodies that were positive for the preceding 3 lysosomal enzymes. The presence of 3 acid hydrolase activities in bodies showing a morphologic pattern identical with that of bodies containing alkaline phosphatase activity is forwarded as a new argument for the presence of alkaline phosphatase in the lysosomes of the absorbing cells of the duodenum.

5673 ELECTRON CYTOCHEMICAL EXAMINATION OF THE THIAMINE PYROPHOSPHATASE ACTIVITY IN THE INTESTINE OF THE RAT. (E.) Saito, T. (Kansai Med. Sch., Osaka, Japan) and K. Ogawa. Nippon Soshikigaku Kiroku (Arch. Histol. Jap.) 27(1-5):473-484, 1966.

The activity of thiamine pyrophosphatase in the normal rat intestine (jejunum, ileum, colon) was investigated. It was strongly positive in the Golgi complex (lamellated cisternae, vesicles and vacuoles) in both the absorptive cells and the goblet cells. Among colonic goblet cells, the Golgi complex of young maturing goblet cells revealed higher enzymatic activity than that of well-matured goblet cells containing numerous mucigen droplets. A probable participation of thiamine pyrophosphatase with the mechanism of cyclic secretion of goblet cells through the Golgi complex was postulated. Enzymatic activity was also observed in the plasma membranes covering microvilli, interspaces between lateral cell surfaces forming plications, the nuclear envelope, the rough-surfaced endoplasmic reticulum and, occasionally, lysosomes in the absorptive cells. Pinocytotic vesicles seen in the vascular endothelium and the smooth muscle cell and axon-Schwann interfaces also revealed positive enzymatic activity.

5674 IN VITRO STUDIES ON THE INTESTINAL TRANSPORT OF AMINO ACIDS AND A SUGAR IN HYPOTHYROID RATS. (E.) London, D. R. (St. Thomas' Hosp., London, S. E. 1) and S. Segal. Endocrinology 80(4):623-628, 1967.

The in vitro uptake of cycloleucine, histidine, valine and α-methyl-D-glucopyranoside into intestinal segments of hypothyroid rats was studied. Segments of jejunum were obtained from animals that had been made hypothyroid by thyroidectomy followed by admin. of 0.5 mC ^{131}I, as well as from control euthyroid animals. With each substance, and at all time points studied, there was an increased intracellular accumulation in the hypothyroid group. This effect was diminished by treating the animals with parenteral triiodothyronine (15 μg) for 4-5 days. When valine accumulation was studied in more detail, no difference was found in the efflux of amino acid from the segments in the hypothyroid and control animals. Michaelis-Menten studies revealed that intestine from hypothyroid rats had a higher transport velocity than either the control or treated hypothyroid group. Valine accumulation was not altered by thyroxine added to incubation flasks containing tissue from the hypothyroid rats. It is suggested that in hypothyroidism there may be an alteration of the transport carrier to give an increased rate of amino acid and sugar transport into the intestinal mucosal cell.

5675 THE STRUCTURE OF THE SMALL INTESTINE AND SOME INTERESTING RELATIONS TO ITS

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5676 ASSESSMENT OF ABSORPTIVE CAPACITY. (E.)(Rev.) Newey, H. (U. Sheffield, England) and D. H. Smyth. *Proc. Nutr. Soc.* 26(1):5-12, 1967.

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5680 RECENT STUDIES ON CARBOHYDRATE ABSORPTION. (E.)(Rev.) Mansford, K. R. L. (Imperial Coll., London). *Proc. Nutr. Soc.* 26(1): 27-34, 1967.

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5683 ABSORPTION OF VITAMIN B_{12} FROM THE INTESTINE. (E.)(Rev.) Spray, G. H. (Radcliffe Infirm., Oxford, England). *Proc. Nutr. Soc.* 26(1):55-59, 1967.

5684 IRON ABSORPTION. (E.)(Rev.) Callender, S. T. (Radcliffe Infirm., Oxford, England). *Proc. Nutr. Soc.* 26(1):59-62, 1967.

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5686 THE ABSORPTION OF CALCIUM FROM THE INTESTINE. (E.)(Rev.) Kodicek, E. (U. Cambridge, England). *Proc. Nutr. Soc.* 26(1): 67-72, 1967.

5687 ANALOG PROGRAM FOR THE WIDDAS MODEL OF SUGAR TRANSPORT. (E.) Hempling, H. G. (Cornell U. Med. Coll., New York, N. Y.). *Biochim. Biophys. Acta* 135(2):355-358, 1967.

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5689 INTESTINAL ABSORPTION OF l-LEUCINE *in vitro* IN FISH (*Stenotomus versicolor* and *Ictalurus nebulosus*). (E.) Neff, S. S. (Marine Biol. Lab., Woods Hole, Mass.) and X. J. Musacchia. *Comp. Biochem. Physiol.* 21(2): 337-343, 1967.

5690 INTESTINAL ABSORPTION OF β-ACETYL-DIGOXIN. (Ger.) Hilger, H. H. (U. Clin. Bonn, Germany), J. Wackerbauer, W. Meyer and D. Hermanutz. *Verh. Deutsch. Ges. Inn. Med.* 72:898-902, 1967.

5691 ALIMENTARY ABSORPTION OF L-ARABINOSE AND D-XYLOSE IN CHICKS. (E.) Wagh, P. V. (U. Minnesota, St. Paul) and P. E. Waibel. *Proc. Soc. Exp. Biol. Med.* 124(2):421-424, 1967.

5692 EFFECTS OF SODIUM ALGINATE ON ABSORPTION AND DEPOSITION OF RADIOACTIVE CATIONS IN THE CHICK. (E.) Colvin, L. B. (Texas A & M U., College Station), C. R. Creger and J. R. Couch. *Proc. Soc. Exp. Biol. Med.* 124(2):566-568, 1967.

5693 INTESTINAL TRANSPORT OF SUGAR AND AROMATIC AMINO ACIDS IN KILLIFISH, *Fundulus heteroclitus*. (E.) Huang, K. C. (U. Louisville Sch. Med., Ky.) and W. R. Rout. *Amer. J. Physiol.* 212(4):799-803, 1967.

5694 A CRITICAL EVALUATION OF THE CALCIUM BALANCE TECHNIC. I. VARIATION IN FECAL OUTPUT. (E.) Isaksson, B. (U. Goteborg, Sweden) and B. Sjögren. *Metabolism* 16(4):295-302, 1967.

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5695 STUDY OF THE ACTION OF ANGIOTENSIN ON GASTRIC SECRETION. (Fr.) Groza, P. (Inst. Physiol., Bucharest), V. Buzoianu, M. Corneanu, S. Ionescu and V. Zamfir. Rev. Roum. Physiol. 4(1):51-56, 1967.

See GAC 2(1):16, 1967 for abstract of paper in Rumanian.

5696 BLOOD FLOW AND SECRETION IN THE STOMACH. (E.) Jacobson, E. D. (U. California, Los Angeles), K. G. Swan and M. I. Grossman. Gastroenterology 52(2)(Pt. 2):414-422, 1967.

A series of studies investigating the relationship between blood flow and gastric secretion were carried out in dogs prepared with vagally denervated Heidenhain pouches of the oxyntic gland area of the stomach. Gastric mucosal blood flow was measured by clearance of aminopyrine by the stomach (comparison of plasma and gastric juice levels). Total arterial inflow to the pouch was measured by chronically implanted electromagnetic flow meters. Infusion of progressively increasing doses of histamine (augmented by bethanechol) increased gastric secretion with increasing dose and was accompanied by correlative increases in gastric mucosal blood flow. A similar relationship was found following inj. of porcine gastrin extract, synthetic pentapeptide, insulin and 2-deoxy-D-glucose. Histamine-induced increases in secretion and mucosal blood flow were depressed in a parallel fashion by pitressin; similar effects were produced by atropine, epinephrine, secretin, and isoprenaline. With low doses of isoprenaline it was possible to increase mucosal blood flow with no effect on gastric secretion. In experiments with graded doses of histamine a 6-fold increase in secretory rate was accompanied by a 4-fold increase in mucosal blood flow with no change in pouch total arterial inflow. Similar data were gathered with extracted and synthetic gastrin. It is concluded that changes in secretory rate were accompanied by directionally corresponding alterations in mucosal blood flow but there is no apparent correlation between secretory changes and alterations in arterial inflow in a variety of situations. The relationship between secretion and blood flow appears to be one in which changing secretory activity induces a corresponding alteration in the local blood supply. In discussion somewhat similar data relying on clearance of ^{42}K to measure mucosal blood flow in anesthetized dogs with intact stomachs were cited showing no change in flow following inj. of secretin, and increased flow following inj. of epinephrine. The differences were not resolved.

5697 MAXIMAL HISTAMINE SECRETION TEST (KAY'S TEST). PROCEDURE AND RESULTS IN NORMAL SUBJECTS. (It.) De La Pierre, M. (U. Turin, Italy), S. Gabasio and G. Bruno. Minerva Med. 57(73):2933-2940, 1966.

Results obtained with the Kay test of maximal histamine secretion are reported in 84 normal subjects (49 men and 35 women; 41 under and 43 over 30 yr. old) and in 10 patients with various gastric diseases. The procedure is outlined and included the following modifications propose by the authors: inj. of antihistamine (mepyramine) 30 min. instead of 1 hr. after the beginni of the test; use of a mechanical aspirator of gastric juice during the first 5 min., followed by spontaneous flow for the next 5 min., followed by manual aspiration during the remaini 5 min. Both the vol. and HCl content of gastric secretion were the same before and after the inj. of Neoantergan. A good variability coefficient was observed in 9 subjects tested twice, with intervals varying from 1 wk. to 3 mo. betwe tests. The vol. of gastric secretion was greate in men than in women of the same age group, especially in younger subjects. Acid content was greater in subjects of both sexes under 30 yr. old; the difference was more evident at pH 7.

5698 GASTRIC SECRETION STIMULATED BY MEAT EXTRACT IN MAN. A TEST OF ANTRAL FUNCTION. (E.) Giles, G. R. (U. Leeds, England) and C. G. Clark. Scand. J. Gastroent. 1(3): 159-166, 1966.

Gastric secretion studies were performed in 14 normals and 40 chronic duodenal ulcer patients. Following an overnight fast secretions were gathered by nasogastric tube. After one hr. of basal collection, 100 ml of meat extract was introduced into the stomach, left for 15 min. and then aspirated. Secretions were gathered for an additional hr. Histamine-stimulated secretion was studied when basal levels were again reached (0.04 mg/kg/hr. i.v.). When max response was reached the infusion was maintained for one additional hr. There was no response to meat extract in 5 normals and 5 patients. The duration of the response in those subjects responding was similar for both normals and patients, although the response of the patients was approx. twice the normal. There was a high correlation between basal secretion and the response to meat. The response to meat extract and the response to histamine stimulation showed good repetition in 6 subjects and poor in 4. In 22 patients stimulated with meat after vagotom 8 showed free acid but at lower levels than in preoperative testing. All showed a lesser but distinct effect of histamine. One patient was studied who secreted 75-100% of the acid secreted in response to histamine when stimulated with meat extract even after vagotomy. Recurrent ulceration in this patient was considered due to antral secretion. It is suggested that one meat extract test provides a useful tool for postoperative (vagotomy) studies of antral functioning.

5699 GASTRIC BLOOD FLOW AND SECRETION IN CONSCIOUS DOGS. (E.) Swan, K. G. (Cornell U. Med. Coll., New York City) and E. D. Jacobson. Amer. J. Physiol. 212(4):891-896, 1967.

The relationship between gastric blood flow and secretion was studied in conscious dogs. When either extracted porcine gastrin or a related, synthetic pentapeptide were admin., each in a wide range of increasing doses, there was a progressive rise in the secretory rate from Heidenhain pouches. After gastrin stimulation, mucosal blood flow, determined by the clearance of aminopyrine, increased as the secretory rate increased, except at the highest rates of secretion. Stimulation with pentapeptide was followed by parallel increases in mucosal blood flow and secretory rate over the entire secretory range. Total blood flow was measured by an electromagnetic blood flowmeter chronically implanted on the artery supplying the pouch; it was not altered by either stimulant of gastric secretion. Secretory rate, mucosal blood flow and arterial inflow were increased when dogs with gastric fistulas were stimulated with either 2-deoxy-D-glucose or insulin. All 3 measurements were reduced by atropine and by an anesthetizing dose of pentobarbital.

5700 PARASYMPATHETIC ACTION ON GASTRIC BIOELECTRIC POTENTIAL IN RATS. (E.) Ridley, H. A. (U.S. Naval Radiol. Def. Lab., San Francisco, Calif.), B. E. Vaughan and J. T. Cummins. Canad. J. Physiol. Pharmacol. 45(2): 281-290, 1967.

Female rats were sacrificed by ether anesthetization, complete decapitation, or stunning. The gastric bioelectric potential *in vitro* was consistently lower in the stunned rats; this depressed potential was prevented by vagotomy and by atropine, either inj. s.c. or directly instilled. Transmural potential and short-circuit current were sharply decreased by 50% when the soln. bathing the mucosal surface was made 10^{-2}M in acetylcholine; there was no detectable effect on transmural conductance. Inhibition of potential was proportional to acetylcholine conc. from 10^{-5} M to 10^{-2} M. Partial recovery was demonstrated by rinsing and replacing soln.; at 10^{-4} M, atropine irreversibly blocked such inhibition. At 10^{-3} M, tubocurarine did not change the response when added before acetylcholine, but at 10^{-4} M physostigmine enhanced the effect of acetylcholine. The acetylcholine analogs, acetylthiocholine, carbamylcholine and acetyl-β-methylcholine (all at 10^{-3} M) reduced potential, as did acetylcholine at 10^{-3} M. Carbamylcholine, which is not appreciably hydrolyzed by acetylcholinesterase, had only slightly greater effect than acetylcholine. Bioelectric potential in these studies was altered without any change in the acid secretion rate. These findings support other studies which demonstrated independence in the isolated rat stomach of electrical and acid secretion parameters.

5701 EFFECT OF INTESTINAL REVERSAL AND MASSIVE RESECTION ON GASTRIC SECRETION. (E.) Grundberg, A. B. (VA Hosp., Des Moines, Iowa), A. S. Lopez and L. R. Dragstedt II. Arch. Surg. (Chicago) 94(3):326-329, 1967.

Reversal of 8-cm jejunal segments produced a slight increase in gastric secretion of HCl in Heidenhain pouch dogs. Postoperative Ba motor meal X-ray studies confirmed an av. increase in gastric and small intestinal emptying times. Subsequently 75% small intestinal resections distal to the reversed segments were performed, with an increase in gastric secretion in 8 of 9 dogs. The role of gastric acid hypersecretion is discussed, and it is proposed that vagotomy and pyloroplasty may be preferred to a reversed small intestinal segment in controlling gastric acid hypersecretion and wt. loss after massive intestinal resection. In clinical practice, a combination of the 2 procedures is probably the best treatment for a patient with massive intestinal resection, providing his condition will allow it.

5702 THE EFFECT OF COMPLETE THORACIC-DUCT LYMPH DIVERSION ON GASTRIC SECRETION IN DOGS. (E.) Yakimets, W. W. (U. Alberta, Edmonton, Canada) and G. F. Bondar. Canad. J. Surg. 10(2):218-222, 1967.

Mongrel dogs of both sexes were equipped with Heidenhain pouches; gastric secretion was determined after they had been divided into 3 groups: 1) fasted dogs without lymph diversion; 2) fed dogs without lymph diversion; and 3) fed dogs with complete thoracic-duct lymph diversion. Protein infusion into the stomach increased secretions from a Heidenhain pouch to nearly twice the baseline level, suggesting (at least in part) a hormonal mechanism. A gastric secretagogue must therefore be conveyed either by the portal venous system, the lymphatic system, or both. Complete diversion of thoracic duct lymph caused a markedly significant decrease in Heidenhain pouch secretion. This suggested 2 possibilities: 1) that fasting thoracic duct lymph conveys a potent gastric secretagogue(s) in quantities sufficient to maintain a steady baseline secretion (the quantity of this secretagogue was greatly increased postprandially); and 2) that the lymphatic system may possibly be important in the hormonal control of gastric secretion since it bypasses the detoxifying capacity of the liver; this was confirmed by the observation that Heidenhain-pouch secretory activity was minimal in lymph-diverted dogs after feeding. Histamine did not appear to be the secretagogue in lymph, since lymph histamine levels did not rise postprandially. Systemic infusion (i.v.) of exogenous histamine in amounts approx. 4 times or more greater than that diverted in lymph was required to stimulate gastric secretion. The gastric secretagogue transported in thoracic duct lymph may be gastrin. Evidence that most of the gastrin or other gastric secretagogues are inactivated by the liver was supported by the marked reduction in Heidenhain-pouch secretion in lymph-diverted dogs, compared to fasted controls.

5703 PRELIMINARY COMMUNICATIONS OF THE EFFECT OF GASTRIN II ON ACID SECRETION IN CONSCIOUS RATS WITH CHRONIC GASTRIC FISTULA.

(E.) Halter, F. (Western Gen. Hosp., Edinburgh, Scotland), P. C. Ganguli, M. Marshall and G. P. Crean. Gastroenterologia (Basel) 106(4): 194-201, 1966.

Male Sprague-Dawley rats were equipped with gastric fistulas made of acrylic acetate. No tests were made for at least 2 wk. following operation. During testing the animals were restrained in Bollman-type cages mounted to rotate to facilitate stomach drainage; the rats were starved 16-20 hr. before testing. At the beginning of the test (6 hr.) a hypodermic needle was placed s.c. and left in place for the inj. of gastrin. The stomach was washed out with water. Secretions were collected at 0.5 hr. intervals; after 4 controls gastrin was inj. and collections were made for 4 hr. When saline was inj. secretion remained steady (10 μEq/30 min.) for the period of 6 hr. The response to gastrin was rapid, the "peak" being reached in 1 hr.; the duration of the response was about 2.5 hr. There was considerable variation between rats; peak effect to 2 μg of gastrin ranged from 120-190 μEq. Data presented for one rat show a linear relationship between the secretory response and log dose. With the data gathered, however, it was not felt possible to define the dose of gastrin evoking a max. secretory response in the rat.

5704 EFFECT OF SECRETIN ON HISTAMINE AND GASTRIN-INDUCED GASTRIC ACID SECRETION.

(E.) Gurll, N. J. (U. California Sch. Med., San Francisco), O. Peloso and W. Silen. J. Surg. Res. 6(9):373-378, 1966.

Heidenhain pouches were prepared in 9 dogs and antrectomy was performed in 6 dogs after completion of baseline secretory tests. Food was withheld 18 hr. pretest. Histamine (0.24 mg/hr.) or gastrin (28.8 g/hr.) were infused i.v. When vol. of secretion from the pouch was stable 75 U of secretin were inj. i.v. Secretions were collected every 15 min. for the duration of the study (4-5 hr.). Secretin failed to inhibit pouch secretion during histamine infusion in 16 of 17 experiments before antrectomy, but did produce a small increase. Following antrectomy histamine produced a larger secretory effect and the effect of secretin was even greater. Secretory output due to stimulation by gastrin was significantly inhibited by secretin both before and after antrectomy; both the secretory effect of gastrin and the inhibition produced by secretin were greater after antrectomy. Before antrectomy secretin inhibited pouch secretion by 18.2%; after antrectomy inhibition was 54.7-56.1%. It is concluded that at least some degree of endogenous inhibition of gastrin and histamine-induced Heidenhain pouch secretion is exerted by the antrum.

5705 THE EFFECTS OF VARYING ATMOSPHERIC CONCENTRATIONS OF CARBON DIOXIDE AND OXYGEN ON GASTRIC ACID SECRETION IN THE PYLORUS-LIGATURED RAT.

(E.) Breen, J. J. (U. Minnesota Med. Sch., Minneapolis), W. P. Ritchie, Jr., J. P. Delaney and O. H. Wangensteen. J. Surg. Res. 7(1):10-16, 1967.

Groups of 10-wk.-old rats (250-300 g) were subjected to pyloric ligature under ether anesthesia after a 48-hr. fast. Rats were placed three to a cage and approx. half the rats were exposed to an atmosphere of room air, the other half to an atmosphere containing varying proportions of CO_2, O_2 and N_2. Conc. of gases in the experimental groups were monitored continuously. After four hr. the rats were decapitated, blood samples taken and the stomachs removed. Gastric contents were assayed for acidity and pepsin activity. Rats exposed to 20% CO_2, 20% O_2 and 60% N_2 showed reduction in vol., free acid and total acid compared to rats in room air. Rats in 10% CO_2, 20% O_2 and 70% N_2 or in 5% CO_2, 20% O_2 and 75% N_2 did not differ from controls. Blood pH levels were reduced in both 10% and 20% CO_2 groups. pCO_2 values were raised in all groups. Rats exposed to 10% O_2 and 90% N_2 showed reduction in vol. and acid. An atmosphere of 10% O_2, 5% CO_2 and 85% N_2 showed no change in secretion; 20% CO_2 and 80% O_2 reduced the vol. and acidity of secretion. It is concluded that hypercapnia and hypocapnia are responsible for reductions in acid secretion, and that hyperoxia and hypoxia of moderate degree are not. No significant alteration in pepsin output was detected.

5706 INHIBITORY ACTION OF CHOLECYSTOKININ ON ACID SECRETION FROM HEIDENHAIN POUCHES INDUCED BY ENDOGENOUS GASTRIN.

(E.) Brown, J. C. (U. British Columbia, Vancouver, Canada) and D. F. Magee. Gut 8(1):29-31, 1967.

Five dogs were prepared with Heidenhain fundic pouches and denervated antral pouches. Gastrin was released by perfusing the denervated antrum with 5% peptone or a 0.1% acetylcholine chloride soln. The Heidenhain pouch was perfused with 25 ml saline, and washed with saline at the end of each 15-min. collection period. When acid secretion from the Heidenhain pouch reached a plateau, cholecystokinin was infused i.v. 1.0-2.0 U/kg. Peptone (5%) pouch infusion usually achieved a plateau of acid secretion after 1.5-2 hr. Admin. of cholecystokinin depressed acid output even though peptone stimulation was continued; the depression was observed in the econd or third 15-min. period following inj. of holecystokinin. The mean inhibition was 72.6%. erfusion of the pouch with acetylcholine prouced almost identical effects as peptone, and a imilar inhibition was produced by cholecystokinin. t is concluded that cholecystokinin produces a rofound inhibition of gastric secretion induced y endogenous gastrin, inhibiting acid output roduced during the hormonal phase of gastric ecretion.

707 EFFECT OF COMBINED BRAIN STIMULATION ON GASTRIC SECRETION, ACIDITY AND OTASSIUM CONCENTRATION IN CATS. (E.) Feldman, . (Hadassah U. Hosp., Jerusalem, Israel), J. ajsbort and D. Birnbaum. Brain Res. 4(1): 03-106, 1967.

Three groups of cats were used to study the effects of dorsal hippocampus stimulation alone, or anterior hypothalamic or hippocampal stimulation immediately preceding posterior hypothalamic stimulation on gastric secretion. All studies were done in the anesthetized preparation. The technics used were previously described. Posterior hypothalamic stimulation increased gastric secretion. With anterior hypothalamus or hippocampal stimulation, or when posterior hypothalamic stimulation followed, no effects on secretion were produced. Combined anterior and posterior hypothalamic stimulation produced a lower rate of secretion than that following anterior hypothalamic stimulation alone. Only posterior hypothalamic stimulation increased acid output. Anterior hypothalamic or hippocampal stimulation inhibited acid output. Combined anterior and posterior hypothalamic stimulation caused a smaller acid output compared to anterior hypothalamic stimulation alone. Posterior hypothalamic stimulation increased K conc.; hippocampal or hippocampus posterior hypothalamic and anterior posterior hypothalamic stimulation decreased K conc. It is concluded that the anterior hypothalamus and dorsal hippocampus modify the effects of the posterior hypothalamus on gastric secretion.

5708 INFLUENCE OF ROUTE OF ADMINISTRATION ON THERAPEUTIC RATIO OF ATROPINE IN SHAM-FED DOGS. (E.) Kubin, R. H. (U. Kansas Med. Ctr., Kansas City), W. R. Keeler and A. P. Klotz. Amer. J. Dig. Dis. 12(4):363-370, 1967.

Three dogs with esophagostomy and gastrostomy were sham fed in a standardized manner at various intervals following the admin. of atropine sulfate or saline. The method of determining salivation and gastric secretion is described in the following paper. Atropine was admin. intragastrically, by a single i.v. dose, or by continuous i.v. infusion. Varying doses were admin. to allow estimation of doses producing 50% inhibition of both salivary and gastric secretion. The route of admin. had a profound effect on salivary and gastric 50% doses. At all time periods the salivary and gastric 50% doses for intragastric doses were 4 times the single i.v. doses. For single i.v. doses the gastric 50% doses were 2-3 times larger than the corresponding gastric 50% doses for continuous i.v. doses. A therapeutic ratio relating gastric and salivary doses in all cases decreased as the interval after dosing increased. The ratio for continuous i.v. admin. was the highest of any route at 40 and 100 min. The authors suggest that continuous i.v. infusion of atropine may be an effective method of inhibiting gastric secretion without materially inhibiting salivary secretion, at least for moderate periods of time.

5709 NONPARALLEL GASTRIC AND SALIVARY GLAND INHIBITION PRODUCED BY ANTICHOLINERGIC DRUGS IN SHAM-FED DOGS. (E.) Kubin, R. H. (U. Kansas Med. Ctr., Kansas City), W. R. Keeler and A. P. Klotz. Amer. J. Dig. Dis. 12(4):371-378, 1967.

Three mongrel dogs were prepared by esophagostomy and gastrostomy. The proximal esophageal stump was sutured to the skin of the neck to form an esophagocutaneous fistula; the distal stoma was ligated to prevent food from entering the stomach during sham feeding. The dogs were maintained by intragastric feeding. Sham feeding was done only once daily. Gastric juice collections were made for 5-15 min., starting 5 min. after the start of sham feeding. The drugs were inj. 20-160 min. preceding sham feeding. Saliva wt. was determined by careful weighing of the sham meal before and after feeding. Dogs were allowed to reingest the esophagostomy effluent for a 5-min. period. Atropine sulfate and heteronium bromide were given in increasing doses until 50% inhibition of control levels was reached. The ratio between the 50% doses for inhibiting salivation and gastric secretion ranged from 4.2 at 20 min. to 0.93 at 160 min. for atropine. The increase in dose necessary for salivary blockade approx. doubled or trebled in 160 min. The gastric dose increased by 10-fold. The same general pattern was seen when heteronium bromide was tested. With atropine at 20 and 40 min. gastric secretion was more sensitive than salivary secretion to anticholinergic inhibition while at 100 and 160 min. the sensitivity was approx. equal. The authors conclude that gastric inhibition and salivary inhibition with the drugs studied are not parallel processes.

5710 FREEZING OF THE INTACT RAT STOMACH: AN INDICATION OF THE BIOLOGIC POTENTIAL OF THE TECHNIC. (E.) Ritchie, W. P., Jr. (U. Minnesota Med. Sch., Minneapolis), J. J. Breen and O. W. Wangensteen. Amer. J. Dig. Dis. 12(4):379-388, 1967.

The technic for freezing the rat stomach as previously described was used in the present study preceding pyloric ligation or histologic study. Freezing of the stomach was carried out under light ether anesthesia. The freezing balloon was placed in the stomach through a stab wound in the anterior wall of the ruminal portion of the stomach. Group A consisted of 35 rats whose stomachs were frozen at -5°C for 3 min., Group B, 11 rats at -10°C for 3 min., and Group C, 7 rats at -15°C for 3 min. Pyloric ligation for 4 hr. in control rats yielded an av. vol. of 8.3 ml, 0.62 mEq free acid, and 0.97 mEq total acid. One wk. after freezing rats from Group A av. 1 ml vol. with no free or total acid, 2 wk. later there was no change, 3 wk. later the av. vol. was 2.1 ml and 0.012 mEq free acid and 0.043 mEq total acid; similar levels were found up to 12 wk. after freezing. Surviving rats in Groups B and C at 12 wk. produced little or no free or total acid; vol. were decreased but approx. normal. In Group A 14 of 35, Group B 4 of 11, and Group C 6 of 7 rats died. Microscopically the stomachs in Groups A and B revealed a reduction in parietal and chief cells and an increase in mucus-secreting elements, generally paralleling the degree of hypothermia. The authors conclude that cold under appropriate conditions can markedly alter the ability of the stomach to secrete acid.

5711 RELATION OF ANTRAL pH TO GASTRIN RELEASE AND FUNDAL pH IN DOGS. (E.) Posey, E. L., Jr. (U. Mississippi Sch. Med., Jackson) and H. Franklin. Amer. J. Dig. Dis. 12(4):356-362, 1967.

Four dogs were prepared with Heidenhain pouches and cannulas placed in the fundus and antrum. Fasting pouch output was measured for 1 hr. Changes in pH in the fundus and pouch, and pouch acid production were studied while antral pH was varied by perfusion with various soln. which were allowed to drain into the duodenum. With antral pH below 1.8 no appreciable secretory effect on the pouch was found. A transition was encountered with antral pH of 1.8-3.0 in which relatively small and variable amounts of pouch acid were produced. Above an antral pH of 3.0 a significant secretory effect was noted that did not increase with further increases in antral pH. Fundal and pouch pH were relatively high and had little relationship to one another when antral pH was less than 1.8. The values fell and became more closely associated at the antral transition zone of pH 1.8-3.0. Above an antral pH of 3.0, fundus and pouch pH decreased and fluctuated in a parallel manner. Pouch pH was consistently below fundal pH. The conventional use of antacids in the treatment of peptic ulcer theoretically can be expected to result in further acid secretion through stimulation by gastrin by the antral pH sensitive mechanism.

5712 SECRETORY RESPONSE TO SUSTAINED HISTAMINE STIMULATION OF THE ISOLATED CANINE STOMACH. (E.) Dritsas, K. G. (U. Alberta, Edmonton, Canada), G. F. Bondar and K. Kowalewski. Brit. J. Surg. 53(9):798-802, 1966

The histamine-stimulated dog stomach in a homologous ex vivo preparation was capable of secretory function for as long as 16 hr. The secretory pattern in response to sustained i.v. (24 μg/min.) and intra-arterial (9.6 μg/min.) stimulation is presented. With regard to electrolyte composition of gastric juice, Cl varied with acidity, Na varied inversely with acidity and K followed a depletion course. Secretory vol. of over 2 ml/min. and HCl conc. over 155 mEq/liter were obtained. Contrary to various types of responses previously reported, this study demonstrated only 1 type of response characterized by a gradual increase in function, a plateau and a gradual decline. Pepsin conc. decreased during histamine stimulation; absolute pepsin output increased well above basal levels during sustained histamine stimulation. The washout theory with regard to pepsin behavior in response to histamine stimulation cannot explain a 16-hr.-long sustained increase in pepsin output, and it is therefore concluded that histamine stimulates pepsin secretion in the denervated canine pouch. The ulcerogenic effect of low arterial CO_2 observed by others was confirmed. Ventilation of an oxygenator dog with 100% O_2 produced an arterial CO_2 pressure of 18 mm Hg, and resulted in multiple superficial ulcers and petechial hemorrhages in the gastric mucosa of the isolated stomach, including the antrum. Ventilation with 97% O_2 and 3% CO_2 produced an arterial CO_2 pressure of 36 mm Hg and was obviously protective to the gastric mucosa.

5713 OUR IMPRESSIONS ON THE FORM, POSITION, MUCOSAL SURFACE AND THE SECRETORY FUNCTION OF THE STOMACH IN YOUNG ALGERIAN SOLDIERS. (Fr.) Kovatchev, D. and M. Younachkov Rev. Int. Serv. Sante Armees 39(11):773-775, 1966.

Of 50 young Algerian men (age 18-24 yr.) without dyspeptic symptoms, 20 (40%) showed gastric hypotonia, 2 (4%) showed hypertonia and the other 28 (56%) were normotonic. Some degree of mucosal hypertrophy was noted in 28%. Gastric acidity was normal in 46% (23 cases); 10% (5 cases) showed hyperacidity and 40% (20 cases) showed hypoacidity (HCl levels were normal in 8; both total acidity and HCl levels were subnormal in 12 cases). Achylia from the presence of duodenal juice in the stomach was noted in 2 cases (4%). This marked deviation from normal in asymptomatic subjects may be considered physiological; no explanation of the phenomenon could be made.

5714 PLACENTAL TRANSFER OF GASTRIC ANTIBODIES. (E.) Fisher, J. M. (Stanford U. Sch. Med., Palo Alto, Calif.) and K. B. Taylor. Lancet 1(7492):695-698, 1967.

mbilical cord-serum was obtained at the time of
elivery from 3 young women (29-35 yr. old)
nown to have gastric mucosal disease and
irculating gastric mucosal antibodies. All 3
ubjects had circulating parietal-cell anti-
odies of the IgG class, and one had IgA anti-
ody in addition. Cord-serum of all infants had
nly IgG antibody. Positive complement-fixation
iters were found in all maternal sera and were
lso found in the cord. The cord-sera of 2
nfants had higher titers than corresponding
aternal sera, and in 1 case it was considerably
igher. Serial studies of the sera of 2 infants
howed progressive decline of the complement-
ixation titer; this was compatible with the
alf-life of γ-globulin and suggested that any
etectable antibody was of maternal origin. In
2 cases, the mothers had other detectable anti-
odies (thyroid microsomal antibody in one,
intrinsic-factor antibodies in the other) that
were also found in the cord serum. Gastric
aspirates were obtained at birth and 3-6 wk.
afterward from 2 infants, but no antibodies
were detected in their gastric juice or that of
their mothers. By indirect means, intrinsic
factor was detected at 3 wk. of age in the
gastric juice of 1 infant, and by direct means
at birth and at 6 wk. of age in another infant.
In the child with circulating intrinsic-factor
antibodies, intrinsic factor could be detected
at 3 wk. in the gastric juice, although he had a
high level of circulating antibody at the time.

5715 STUDIES ON SECRETORY VARIATIONS INDUCED BY A NEW PREPARATION WHICH STIMULATES GASTRIC SECRETION.

(It.) De La Pierre, M. (U. Turin, Italy) and C. Saracco. Minerva Gastroent. 12(1):24-27, 1966.

The effects on gastric secretion of a new drug containing gelatin and protease obtained from *Aspergillus oryzae* were studied in 40 patients of both sexes (30-76 yr. old) with dyspeptic disturbances but no clinical, X-ray, or laboratory evidence of organic gastric disease. A suspension of the drug was prepared by adding 4 tablets to 50 ml of lukewarm water and admin. by gastric tube. After 1 hr., the vol. of gastric juice secretion was increased 47.8% and free acid levels increased 49.1% in 34 of 40 patients; both values were statistically significant with respect to controls. Total acid content was increased (36.4%) in 34 patients and slightly decreased in 6. Free acid output increased 116% at a pH of 3.5 and 96.4% at a pH of 7.5; 36 patients showed an increase and 4 a moderate reduction. Absolute values of acid output increase was greatest in patients who showed normal acidity before the test than in those who were hyper- or hypoacidic. The percentage increase in acid output was proportionally greater in hypoacidic patients than in normo- or hyperacidic patients. The gastric secretory response to the drug lasted more than 60 min. Overall results indicate a positive response in 85%, with 15% either showing no change or reduced acid output. No subjective disturbances or side effects were observed.

5716 SECRETORY FUNCTION OF THE STOMACH IN PARATHYROIDECTOMIZED RATS.

(Rus.) Skatkov, M. E. (Inst. Normal Pathol. Physiol., Acad. Med. Sci., Moscow). Biull. Eksp. Biol. Med. 62(11):50-51, 1966.

Studies on the secretory function of the stomach in parathyroidectomized and normal white rats revealed that parathyroidectomy leads to increased total and free acidity of the gastric juice. However, the removal of the glands did not affect the vol. of the juice excreted. Admin. (s.c.) of histamine (0.5 mg/animal) further increased the free and total acidity, but decreased the proteolytic activity of the gastric juice of both parathyroidectomized and normal rats by approx. 20% and 60%, resp. These studies were begun one wk. after removal of the gland and continued for 6 mo.

5717 ANALYSIS OF CHLORINE EXCRETION FUNCTION OF THE STOMACH IN MAN AND IN EXPERIMENT.

(Rus.) Torosov, T. M. (Kirov Milit. Med. Acad., Leningrad, USSR). Biull. Eksp. Biol. Med. 62(11):20-23, 1966.

The conc. of neutral chlorides in gastric juice of man or dog was correlated with its acidity and with the conc. of chlorides in the blood. The conc. of neutral chlorides in the gastric juice from the fasting stomach varied in parallel with the level of chlorides in the blood. No correlation was found between the conc. of neutral chlorides in gastric juice from the fasting stomach and its acidity. As secretion began, the conc. of neutral chlorides in the gastric juice gradually decreased and became inversely proportional to the acidity of the juice. These relationships indicate that HCl is synthesized extracellularly in the stomach. With respect to chlorides, the gastric juice represents a mixture of the secretions of the chief and auxiliary cells, containing approx. 100 mEq chlorides/liter, and secretions of border cells, with chloride content varying between 0-200 μEq/liter.

5718 THE ACTION OF 10(α-DIMETHYLAMINOPROPIONYL) PHENOTHIAZINE METHOBROMIDE UPON MAXIMUM GASTRIC SECRETION STIMULATED WITH THE HISTAMINE AND HISTALOG.

(Sp.) Laudano, O. M. (Fac. Med. Sci., Rosario, Brazil). Prensa Med. Argent. 53(29):1604-1606, 1966.

Two groups of patients were studied. Group 1 consisted of 25 subjects (19 men, 6 women; 21-43 yr. old; 14 healthy normals, 11 with duodenal ulcers). The action of 10(α-dimethylaminopropionyl) phenothiazine methobromide on gastric secretion stimulated with an augmented histamine test was studied. Histamine (i.m.;

0.5 mg/kg) and an antihistamine were used. The title compound decreased gastric secretion. Side effects included dryness of the mouth, mydriasis, tachycardia and visual disturbances. In Group 2 (7 men, 3 women; 19-51 yr. old; 6 healthy normals and 4 with duodenal ulcer), no antihistamine was given and the histamine dose was 2.0 mg/kg. The drug did not decrease the gastric stimulation previously stimulated by the augmented histamine test. It is concluded that 10(α-dimethylaminopropionyl) phenothiazine methobromide is a strong anticholinergic agent with a very small ganglionic-blocking action.

5719 STUDY ON GASTRIC SECRETORY ACTIVITY BY THE CARBOWAX-CONGO RED METHOD. (Jap.) Konaka, K. (Kumamoto U. Med. Sch., Japan), T. Shudo, M. Okabe, Y. Matsuoka and T. Yasumitu. Kumamoto Igakkai Zasshi (J. Kumamoto Med. Soc.) 41(1):32-40, 1967.

A mixture of Carbowax and Congo Red (20:1) was spread on the exposed gastric mucosa of anesthetized rats, and the change in color of the Congo Red caused by gastric acid secretion was observed. After the inj. of histamine (5 μg/150 g i.v.; 100 μg/150 g s.c.), synthetic gastrin active group (synthesized by Esai Co., Ltd.: TFA-NH_3-TRY-MET-ASP-PHE-NH_2: 50 μg/150 g i.v.) or swine pancreas extract prepared by the authors with the use of AE-cellulose column chromatography (AE-FH) (70-80 μg/150 g i.v.), increase of gastric secretory activity was observed. The increase was found in 2-3 min. after inj., and continued for more than 60 min., with histamine, for around 45 min. with gastrin active group and for 20-30 min. with AE-FH. A marked increase in secretion of free acid and total acidity was observed after the i.v. infusion of 50 ml of 50-fold diluted soln. of AE-FH for 60 min. in dogs with gastric cannula, both conc. increasing to 15-18 times the initial level for 30-120 min. after the start of infusion.

5720 HETEROGENEITY AND SEQUENCE OF APPEARANCE OF RABBIT ANTIBODIES TO HOG INTRINSIC FACTOR. (E.) Samloff, I. M. (U. Rochester Sch. Med. Dent., New York) and E. V. Barnett. J. Immun. 98(3):558-567, 1967.

Primary and secondary immune responses of rabbits to hog intrinsic factor concentrates were studied with the radioimmunoelectrophoretic method. Three anti-hog intrinsic factor concentrate-^{60}Co-B$_{12}$-binding antibodies were detected. When a goat anti-rabbit serum was used as a developer γM and γG antibodies were found to appear simultaneously, 7-8 days after primary immunization. When the developing serum was not used, an illusion suggesting the later appearance of γG antibody was noted. These findings offer further evidence for the concurrent synthesis of γM and γG antibodies after primary immunization. The data additionally suggest that early γG anti-hog intrinsic factor antibody forms a soluble or easily dissociable complex with hog intrinsic factor concentrate-^{60}Co-B$_{12}$, while later γG antibody forms an insoluble or less readily dissociable complex with the radioactively labeled antigen. In 2 of 3 rabbits, a third hog intrinsic factor concentrate-^{60}Co-B$_{12}$-binding antibody appeared from 3-4 wk. after primary immunization. This antibody migrated slightly faster than γG on electrophoresis in agar gel, was eluted with γG-globulins from Sephadex G-200 and was resistant to 2-mercaptoethanol. After secondar immunization there was an anamnestic response for the synthesis of all 3 antibodies.

5721 SEPARATION OF VITAMIN B12-BINDING PROTEINS OF SERUM, GASTRIC JUICE AND SALIVA BY RAPID DEAE CELLULOSE CHROMATOGRAPHY. (E.) Retief, F. P. (Mount Sinai Hosp., New York City), C. W. Gottlieb, S. Kochwa, P. W. Pratt and V. Herbert. Blood 29(4):501-516, 1967.

A technic of DEAE cellulose chromatography is presented by which the principal vitamin B$_{12}$ binders in serum, gastric juice and saliva may be separated in less than 2 hr. into 2 distinct fractions, 1 containing α-globulin binder and the other containing β-globulin binder. Typica elution patterns of α-globulin and β-globulin B12 binders from normal (80% β, 20% α), pernici anemia (66.6% β, 33.3% α) and chronic myeloid leukemia (75% α) sera are presented. Chromatography of normal gastric juice produced 2 peaks of B$_{12}$-binding material, 1 containing all the intrinsic factor B$_{12}$ binder (as well as some non-intrinsic factor binder), and the other consisting almost exclusively of non-intrinsic factor B$_{12}$ binders. Pernicious anemia gastric juice also produced 2 peaks, but intrinsic factor was lacking. Saliva had 1 main peak of B$_{12}$-binding material which seemed to correspond to the non-intrinsic factor binder of normal gastric juices; both of these eluted with the α-globulin fraction.

5722 CHOLECYSTOKININ--PANCREOZYMIN (CCK-PZ). (Sw.) Jorpes, E. (Karolinska Inst., Stockholm) and V. Mutt. Nord. Med. 77(8):237-242, 1967.

Cholecystokinin (CCK) was isolated from the first meter of the small intestine of 20 hogs, cooked, frozen and ground (1.400 g) through a series of extractions, adsorptions, elutions, precipitations and fractionations in 9 steps. The sixth step resulted in 20 g of material with 20 Ivy dog U of CCK/mg and 80 Crick, Harper and Raper pancreozymin (PZ) U/mg; step 7 yielded 750 mg of material with 250 U of CCK and 1000 U of PZ/mg; step 8 yielded 60 mg of material with activities of 1500 and 6000 U/mg of CCK and PZ, resp. The last step resulted in 12 mg of material with 3,000 U of CCK and 12,000 U of PZ/mg. During the steps in purification he CCK and PZ activity maintained a fixed atio of 1:4. The activity per mg of the final reparation was 10,000 times that in Crick, arper and Raper's original PZ preparation. It s concluded that both hormonal activities are xerted by the same compound. A review of the hysiological effects of CCK and PZ is presented ith clinical applications of the hormonal ctivities in cholecystography and cholangiog- aphy and in the combined PZ and CCK test for he diagnosis of chronic pancreatitis and cancer f the pancreas and biliary system. CCK has eplaced the fat meal in cholecystography technic n Sweden. CCK (250 Ivy dog U) has been used n biliary surgery.

723 A CHEMICAL, IMMUNOLOGICAL AND ELECTRON-MICROSCOPIC STUDY OF CENTRIFUGED HUMAN UBMAXILLARY SALIVA. (E.) Caldwell, R. C. (U. labama Med. Ctr., Birmingham) and J. M. hackleford. Arch. Oral Biol. 12(3):333-340, 967.

uman submaxillary saliva was collected from 4 ealthy male subjects; it contained a variety of ytoplasmic fragments which were demonstrated by lectron microscopy of the sediment from saliva entrifuged at 59,700 g. This procedure yielded a viscous material (salivary gel) containing a onsiderable number of electron-dense granules and vesicles varying in size from approx. 1.0 μ to as small as 250 Å. Vesicles were found free or as inclusions in fragments of cytoplasmic material containing partially disintegrated mitochondria and membranes. Blebs of cytoplasm were occasionally enclosed by structures that were membranous in appearance. Chemical analysis of salivary gels obtained from 1 secretor and 1 nonsecretor of blood group substances demonstrated that the gels contained considerably less than 10% of the total salivary protein. Fucose, sialic acid, hexose and hexosamine were also found in the gels. The absolute and relative amounts of carbohydrate differed in salivary gels from the secretor and the nonsecretor of blood group substances. Blood group assays suggested that blood group substances A, Le(a) and Le(b) were conc. in the salivary gel.

5724 RECORDING THE PATTERN OF SALIVARY FLOW. (E.) Mason, D. K. (Western Infirm., Glasgow, Scotland), R. M. Harden, D. Rowan and W. D. Alexander. J. Dent. Res. 45(5):1458-1463, 1966.

An instrument designed around 3 photoelectric detectors into which were inserted polyethylene cannulae conveying saliva from the patient was used. Each detector consisted of a glass-drip chamber, a photo-transistor and a lamp arranged so that the beam of light falling on the phototransistor was interrupted by the falling drop. Saliva was collected from volunteers by use of a modified Carlson-Crittenden cup, cannulation of the submandibular duct, or by the use of a segregator appliance. Lemon juice, salt, beef bouillon cubes, fruit-flavored candy and paraffin-wax were used as stimulants. Iodine was estimated in samples of the saliva using a chloric acid digestion method. It was found that at any one flow rate the drop size remained relatively constant. An inverse relation was found between the salivary iodide conc. and the rate of salivary flow. Swallowing was found to produce a transient increase in flow rate. The effect of a severe stimulus, lemon juice, was found to persist for some time after the stimulus had stopped. Irregular flow rates caused by swallowing, irregular application of stimulants were found to yield inaccurate results using iodine secretion as a dependent variable.

5725 THE EXPERIMENTAL PRODUCTION OF WATERY VACUOLATION IN THE ACINAR CELLS OF THE SUBMANDIBULAR GLAND. (E.) Tapp, R. L. (U. Cambridge, England) and O. A. Trowell. J. Physiol. (London) 188(2):191-205, 1967.

The vacuoles were cytoplasmic, membrane-walled and 2-20 μ in diameter; they were visible in living cells and appeared to contain a watery fluid. Vacuolation occurred regularly under 3 experimental conditions: 1) in vivo, during secretion; 2) after death, in animals killed by anoxia; and 3) in vitro, under anoxic conditions. By means of in vitro experiments, it was demonstrated that vacuolation occurs only when the cells are both anoxic and exposed to an excess of extracellular fluid containing Ca and HCO_3; it was also shown that vacuolation is reversible in O_2 and that both its development and recovery are temperature-dependent. Evidence is presented suggesting that the vacuolation is not caused by simple osmosis, that it is not a degenerative or necrotic change and that it is accompanied by the entry of fluid into the cells. The mechanism of vacuolation and its possible relation to secretion are discussed, and it is suggested that vacuolation represents an imbalance between the ingestion and secretion of water and salts. Similar vacuoles, apparently produced by the same mechanism, were seen in the acinar cells of the parotid gland and the pancreas of the rat. The close similarity of this vacuolation to that previously described in rat liver cells was noted.

5726 CHOLERETIC EFFECT OF ATROPINE IN THE RAT: EFFECT ON EXTERNAL PANCREATIC SECRETION. (Fr.) Debray, C. (Bichat Hosp., Paris), C. Vaille, J. De La Tour, C. Roze and M. Souchard. Path. Biol. (Paris) 15(1-2):51-54, 1967.

In urethan-anesthetized rats, doses of atropine causing prolonged respiratory stimulation (30 mg/kg i.v.) and induced a slight, delayed (3 hr.) increase in pancreatic secretion. Bile secretion in control animals decreased 9%; in atropine-treated animals a marked, prolonged choleresis was noted (by 18% at 10 min., 46% at 1 hr., 28% at 2 hr. and 10% at 3 hr.). This choleretic response could not be explained by changes in transhepatic blood flow or by relaxation of the bile ducts (which was weak). It is suggested that atropine stimulates bile production by a direct action on the liver cells.

5727 CHROMATOGRAPHIC BEHAVIOUR OF PANCREATIC AMYLASE. (E.) Szabo, M. T. (U. Budapest, Hungary) and F. B. Straub. Acta Biochim. Biophys. Acad. Sci. Hung. 1(4):379-387, 1966.

Amylase was isolated from pig pancreas and recrystallized from an ammonia soln. or from an urea soln. Chromatography was done on DEAE-Sephadex A-50 (medium) columns equilibrated with either a buffer soln. of pH 7.5 containing 10^{-2} M TRIS-HCl, 10^{-4} M mercaptoethanol, 5 x 10-3 M Ca ions and 2 x 10^{-2} M Cl ions or with a similar soln. without mercaptoethanol. Amylase activity was assayed by Smith and Roe's method. In the absence of mercaptoethanol, amylase crystallized from ammonia soln. was more strongly bound to the ion exchanger than amylase crystallized from urea soln. In the presence of mercaptoethanol several active peaks were obtained, indicating the presence of several active forms of amylase. Under these conditions amylase crystallized from ammonia soln. existed in 2 active forms whereas amylase recrystallized from urea soln. was present in the form of 4 active proteins. It was possible to convert one of the active forms into another by lyophilization with NaCl present. It is concluded that amylase of pig pancreas may exist in different structural forms which are all enzymatically active and which can be separated by chromatography on DEAE-Sephadex column.

5728 THE OUTPUT OF PROTEIN AFTER PANCREOZYMIN. A TEST OF PANCREATIC FUNCTION. (E.) Hanscom, D. H. (VA Hosp., Hines, Ill.), B. M. Jacobson and A. Littman. Ann. Intern. Med. 66(4):721-726, 1967.

Data were collected in 26 normal controls and 63 patients with known pancreatic disease. Duodenal contents were collected by means of a Dreiling double-lumen tube passed into the duodenum under fluoroscopic control. Secretin (1.5 U/kg) was inj. i.v. in 5 min. and six 10-min. specimens collected from the duodenum. At the end of the hr. an infusion of secretin (1.5 U/kg/hr.) was begun and a 1.5 U/kg i.v. dose of pancreozymin was inj. and two 15-min. collections made. Finally 4.5 U/kg of pancreozymin was inj. and two 15-min. collections made. The protein output in the duodenal contents separated controls from chronic pancreatitis patients with little overlap. Other forms of pancreatitis were less often separated from normal but more often with pancreozymin than with secretin. Discriminant function analysis indicated that the pancreozym test separated normal and chronic pancreatitis groups better than the secretin test and with n overlapping. When data from both tests was used there was further diagnostic improvement. It is suggested that if this use of discriminan function analysis is validated, it should be useful in assessing lesser degrees of pancreati injury.

5729 THE ELECTRICAL PROPERTIES OF RESTING AND SECRETING PANCREAS. (E.) Clark, D. G. (U. Newcastle upon Tyne, England), J. R. Greenwell, A. A. Harper, A. M. Sankey and T. Scratcherd. J. Physiol. (London) 189(2): 247-260, 1967.

Electrical properties of the resting and stimulated pancreas were studied in the anesthetized cat. An inverse relationship was found between the frequency of applied alternating current and the resistivity and dielectric constant of the resting pancreas. Resistivity was also affected by the fat content of the gland. The impedance locus of the pancreas was similar to that of other tissues. There was a brief increase, followed by a more marked decrease, in pancreatic conductance and capacitance after i.v. inj. of secretin. The phase of decreased conductance was related to the flow of pancreatic juice. The decrease in conductance and flow was characterized by 2 closely related empirical equations. During secretin stimulation the Na conc. in pancreatic tissue increased and the K conc. decreased. It is suggested that the decreased conductance across the secreting gland was chiefly due to swelling of the secretory cells and, to a minor degree, it is the result of changes in the composition of the secretion in the pancreatic ducts. In the anesthetized cat, the mean half life of the secretory action of secretin is 199 sec.

5730 "NON-PARALLEL TRANSPORT" OF ENZYME PROTEIN BY THE PANCREAS. (E.) Rothman, S. S. (Harvard Med. Sch., Boston, Mass.). Nature (London) 213(5075):460-462, 1967

Secretions were collected directly from the pancreatic duct of rabbits *in vitro* using previously described technics. Collections of secreted fluid were made at hourly intervals. When pancreozymin (6 Ivy dog U of Cecekin/100 ml of water in bath) was added to the organ bath in the *in vitro* studies an enhancement in secretion of trypsinogen was observed while chymotrypsinogen secretion was only slightly elevated. The trypsin/chymotrypsin ratio was doubled compared to controls, suggesting a selective se- cretion of protein by the pancreas. Methacholin chloride added to the organ bath (0.8 mg/100 ml) increased the output of both trypsinogen and chymotrypsinogen. The trypsin/chymotrypsin tio was more variable but there was no nsistent difference from controls. It is ggested that the "selectivity" in the secre- on process most likely occurs in the release ase or in transport of protein from the zymogen anules or cytoplasm into duct lumina. ggested mechanisms were: competition for asma membrane sites by granules containing fferent enzymes, an alternation in the rates enzyme secretion from within the granules, or mpetition for transport sites by the enzymes emselves.

731 THE EXHAUSTION OF THE PANCREOZYMIN EFFECT ON PANCREATIC SECRETION. (Ger.) uhac, I. (First Med. Clin., Acad. Med., Lubeck, ermany) and U. Ritter. Z. Gastroent. 4(5): 79-283, 1966.

e pancreatic ducts of 13 rabbits (3000 g) were atheterized, the secretion collected in 30-min. eriods, and its vol. and α-amylase conc. deter- ined; 3 animals served as controls; the pontaneous secretion was collected for a total f 210 min. Seven animals were inj. i.v. with U/kg and 3 with 4 U/kg pancreozymin at the eginning of each 30 min. period except the irst, during which the basic secretion was ollected. After the experiment pancreatic issue was collected from 11 animals and pre- ared for study. There were large individual ifferences among the animals both in vol. and -amylase conc. of the basic secretion. After 10 min. and 6 pancreozymin inj., the vol. as ell as the amylase level tended to approach the asic values, although still somewhat elevated. he 2 U/kg pancreozymin dose caused an av. ncrease over 180 min. in vol. of about 50% and n av. 4-fold increase in enzyme; 4 U/kg ancreozymin increased the vol. by about 75% of he basic value and the enzyme content 8-fold, v. over the entire experimental period. istological examination of the glands dis- losed no visible decrease in granules; in 2 animals some cellular breakdown and pyknotic uclei were observed; another animal showed some conc. of round cells and edema. However, hese conditions may have been due to causes other than pancreozymin. There was no indication of exhaustion of either fluid or enzyme secretion due to pancreozymin. The effectiveness of pancreozymin seemed to have decreased.

5732 PANCREATIC SECRETION IN RATS WITH PROTEIN MALNUTRITION. (E.) Lemire, S. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and F. L. Iber. Johns Hopkins Med. J. 120(1): 21-25, 1967.

Male Sprague-Dawley rats (40; 135-165 g) were divided into 2 groups; 20 were fed a normal diet and served as controls. The remaining 20 were fed a protein-free diet (corn starch, 70%; alphacel, 15%; vegetable oil, 10%; salt mixture USP XIV, 4%; and cod liver oil, 1%). An additional group of 30 male rats (av. wt. 116 g) was used to assess recovery from the protein-deficient diet. In protein-deficient rats the mean body wt. decreased from 150 to 109 g; total serum protein decreased from 5.8 to 3.8 g/100 ml. In controls, wt. increased from 151 to 270 g, and serum protein did not change significantly from a mean of 6.2 to 5.8 g/100 ml. Protein-deficient rats produced an av. of 0.027 ml of pancreatic juice in 15 min., but control rats produced 0.065 ml in the same time. Protein deficient rats produced 0.41 U of trypsin activity in the stimulated juice, compared to 2.26 U in controls. Bicarbonate production was 0.81 μEq in protein-deficient animals, compared to 2.40 μEq in controls. Histological study showed that secretory granules had largely disappeared in the cellular cytoplasm of protein-deficient rats, in contrast to the normally-fed animals. Data from rats placed on a normal diet after protein deficiency showed that the whole process can be almost completely reversed within a wk. of adequate protein intake.

5733 COMPARATIVE STUDY OF THE CONTROL OF AMYLASE BIOSYNTHESIS IN RAT PANCREAS AND PAROTID GLANDS. (E.) Palla, J. C. (Fac. Sci., Marseille, France), A. Ben Abdeljlil and P. Desnuelle. Biochim. Biophys. Acta 136(3): 563-565, 1967.

5734 EXPERIMENTAL DATA ON THE SECRETORY CYCLE OF THE EXOCRINE PANCREATIC CELL OF Salientia amphibia (TOAD) WITH PARTICULAR REGARD FOR NUCLEO-CYTOPLASMATIC INTERACTIONS. 1) EFFECTS OF PILOCARPINE. (It.) Misuraca, G. (U. Naples, Italy), E. Limatola and V. D'Uva. Boll. Soc. Ital. Biol. Sper. 42(24):2034-2038, 1966.

5735 DIFFERENTIATION AND STUDIES OF MOLECULAR WEIGHT OF PANCREATIC ENZYMES FROM DIFFERENT SPECIES. (Ger.) Müller-Wieland, K. (U. Clin. Hamburg, Germany) and W. Berndt. Verh. Deutsch. Ges. Inn. Med. 72:716-718, 1967.

5736 THE EFFECTS OF OSMOLARITY ON PANCREATIC SECRETION. (E.) Case, R. M. (U. Newcastle upon Tyne Med. Sch., England), A. A. Harper and T. Scratcherd. J. Physiol. (London) 189(2):72P, 1967.

5737 SOME NOTES ON THE HISTORY OF GASTRIN. (E.) Grossman, M. I. Pp. 1-7 in Gastrin. Grossman, M. I. (Ed.). University California Press, Los Angeles, 1966, 351 pp.

5738 STUDIES ON THE CHEMISTRY OF GASTRINS I AND II. (E.) Gregory, R. A. (U. Liverpool, England) and H. J. Tracy. Pp. 9-26 in Gastrin. Grossman, M. I. (Ed.). University of California Press, Los Angeles, 1966, 351 pp.

5739 CHARACTERIZATION OF A PURE GASTRIN. (E.) Tauber, S. D. (U. Texas, Dallas). Pp. 27-47 in Gastrin. Grossman, M. I. (Ed.). University of California Press, Los Angeles, 1966, 351 pp.

5740 ASSAY OF GASTRIN. (E.) Emas, S. (Karolinska Inst., Stockholm) and B. Uvnäs. Pp. 49-67 in Gastrin. Grossman, M. I. (Ed.). University of California Press, Los Angeles, 1966, 351 pp.

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5747 INHIBITION OF ACID SECRETION BY GASTRIN EXTRACTS. (E.) Gillespie, I. E. (U. Glasgow, Scotland). Pp. 229-253 in Gastrin. Grossman, M. I. (Ed.). University of California Press, Los Angeles, 1966. 351 pp.

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5749 GASTRIN-LIKE ACTIVITY OF TUMORS: A REVIEW. (E.) Hallenbeck, G. A. (Mayo Clin., Rochester, Minn.). Pp. 285-308 in Gastrin. Grossman, M. I. (Ed.). University of California Press, Los Angeles, 1966, 351 pp.

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5751 DISTRIBUTION OF GLUTAMINASE ACTIVITY IN THE STRUCTURE OF THE FUNDAL GLANDS OF THE STOMACH. (E.) Maramaa, S. I. Bull. Exp. Biol. Med. 62(7):817-821, 1966. [Transl. Biull. Eksp. Biol. Med. 62(7):98-103, 1966.]

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5754 CHANGES IN GASTRIC SECRETION IN DOGS AFTER UNI- AND BILATERAL ADRENALECTOMY (E.) Mikoś, E. (Sch. Med., Cracow, Poland). Acta Physiol. Pol. 17(1):55-64, 1966.

5755 STUDIES OF THE CORRELATIONS BETWEEN MOTILITY AND GASTRIC SECRETION: EFFECT OF HYDROCHLORIC ACID AND SODIUM BICARBONATE (ENDOSCOPIC OBSERVATIONS). (It.) Mazzone, O. (U. Catania, Italy), A. Blasi and F. Sorrentino. Arch. Ital. Mal. Appar. Dig. 33(2): 181-185, 1966.

5756 A STEEL CANNULA FOR COLLECTING GASTRIC JUICE DURING EXPERIMENTS. (E.) Percival, H. G. (Reading U., Berkshire, England) J. Physiol. (London) 188(2):11P-12P, 1967.

5757 STUDIES ON THE MECHANISM OF SALIVARY SECRETION BY ATP WITH CANINE SUB-

XILLARY GLAND. (Jap.) Yoshimura, H. (Kyoto
efect. U. Med., Japan), Y. Imai, M. Miuoshi,
Yamamoto and K. Hirai. Nippon Seirigaku
sshi (J. Physiol. Soc. Jap.) 29(2):59-64, 1967.

5758 PAROTID SECRETION AFTER CUTTING THE AURICULOTEMPORAL NERVE AT DIFFERENT LEVELS. (E.) Emmelin, N. (U. Lund, Sweden). J. Physiol. (London) 188(2):44P-45P, 1967.

See also abstract nos.: 5992,6296,6591

5759 INTESTINAL DIGESTION OF MALTOTRIOSE IN MAN. (E.) Messer, M. (Roy. Child. Hosp., Melbourne, Australia) and K. R. Kerry. Biochim. Biophys. Acta 132(2):432-443, 1967.

Maltotriose comprised approx. 25% of the end products of the action of duodenal juice on starch *in vitro*; it was largely resistant to the action of the juice but was readily hydrolyzed to glucose by homogenates of the small intestinal mucosa. The rate of hydrolysis of maltotriose by intestinal mucosa was of the same order as that of maltose, isomaltose, lactose, trehalose and sucrose. The Michaelis constant for maltotriose was similar to that for maltose. Mixed substrate incubation experiments indicated that intestinal maltotriase activity is at least partially due to enzymes which also act on sucrose, isomaltose and maltose. Using heat inactivation, intestinal maltotriase activity was separated into 3 distinct fractions; all of these had maltase and isomaltase activity. The pattern of heat inactivation indicated that maltotriase activity is exerted principally by the α-glucosidases designated (Dahlqvist) maltases Ia, Ib and III. Activity of maltotriase was considerably subnormal in duodenal mucosal specimens obtained from patients with congenital absence of maltases Ia and Ib; this was a further indication that these enzymes are involved in the hydrolysis of maltotriose.

5760 METABOLISM OF CIRCULATING DISACCHARIDES IN MAN AND THE RAT. (E.) Weser, E. and M. H. Sleisenger. (New York Hosp., N. Y.) J. Clin. Invest. 46(4):499-505, 1967.

The metabolism of circulating disaccharides was investigated in nonfasting male Sprague-Dawley rats and in adult humans (both normals and patients with untreated celiac disease). No elevation in blood glucose was observed after i.v. infusions of 10 g of either maltose, lactose or sucrose in 4 normal adults. A mean of 6.3 ± 1.39 g of sucrose and 8.7 ± 1.89 g of lactose was excreted in the 24-hr. urine sample. Only 0.11 ± 0.03 g of infused maltose was recovered in the urine, thereby suggesting that maltose was metabolized. Patients with untreated celiac disease excreted 4 times more urinary lactose and sucrose, but not maltose, than normals. After inj. of ^{14}C-labeled lactose and sucrose in rats, 6.2 ± 2.7 and 7.6 ± 2.4%, resp., was oxidized to $^{14}CO_2$ in 24 hr.; 62.1 ± 13.5 and 68.4 ± 10.8% of the disaccharides, resp., was excreted into the urine. In contrast, after the inj. of ^{14}C-labeled maltose, 54.6 ± 7.0% was oxidized to $^{14}CO_2$ and 4.8 ± 3.9% was excreted in the urine. The per cent of maltose oxidized to CO_2 was similar to that of glucose. In addition to small intesti mucosa, homogenates of rat kidney, liver and brain as well as serum were found to have measurable maltase activities. The role of th tissue maltases in the metabolism of circulati maltose and maltosyloligosaccharides is discus

5761 THE EFFECTS OF ZINC DEFICIENCY ON PANCREATIC CARBOXYPEPTIDASE ACTIVITY AND PROTEIN DIGESTION AND ABSORPTION IN THE RA (E.) Mills, C. F. (Rowett Res. Inst., Bucksbu Aberdeen, Scotland), J. Quarterman, R. B. Will A. C. Dalgarno and B. Panić. Biochem. J. 102(712-718, 1967.

Proteolytic enzyme activities were studied in the pancreas of Zn-deficient and control rats. No change was detected in trypsin-plus-chymotrypsin activity. Carboxypeptidase activity w appreciably lowered in Zn deficiency and rapid returned to normal on Zn therapy. When U-^{14}C-labeled *Chlorella* protein was fed, there was n evidence that reduction in carboxypeptidase activity had limited the rate of protein diges or absorption. Specific activity of pancreati protein synthesized during these experiments w much lower in Zn-deficient rats than in contro A higher proportion of the total activity pres in each organ examined, was in the non-protein fraction in Zn-deficient rats.

5762 RATE OF SPLITTING AND ABSORPTION OF PROTEIN (CASEIN I^{131}) IN THE DIGESTI TRACT AND EXCRETION OF PRODUCTS OF ITS HYDROLY WITH BILE. (Rus.) Zamychkina, K. S. (Inst. Normal Pathol. Physiol., Moscow). Biull. Eksp Biol. Med. 62(11):17-19, 1966.

Healthy dogs and dogs with pathological liver changes, induced by experimental fistula of th gallbladder, were fed with ^{131}I-labeled casein (100-200 cpm/g). The labeled protein was quic hydrolyzed by gastric and intestinal juices, a confirmed by *in vitro* experiments, and the radioactive split products appeared in the blo Their level reached a max. 60-90 min. after admin. of the labeled protein, and were rapidl excreted from the blood of healthy dogs; they accumulated in the bile. In dogs with hepatit the excretion of these split products from the blood and their accumulation in the bile w markedly decreased. Thus, the bile-producing function of the liver plays an essential role the excretion of protein digestion products no utilized by the organism from the blood.

MOTILITY

'63 PROPERTIES OF THE INHIBITORY POTENTIAL
OF SMOOTH MUSCLE AS OBSERVED IN THE
SPONSE TO FIELD STIMULATION OF THE GUINEA-PIG
ENIA COLI. (E.) Bülbring, E. (U. Oxford,
gland) and T. Tomita. J. Physiol. (London)
39(2):299-315, 1967.

ne inhibitory potential evoked by field stimula-
on of the guinea pig taenia coli was studied
n hypertonic soln. in which the spontaneous
lectrical and mechanical activity was slowed or
bolished. No direct correlation was found between
ne inhibitory potential and the muscle membrane
olarization in response to the stimulating
urrent. Chronaxie for the inhibitory potential
as less than 1 millisec.; that for the muscle
pike was 20-30 millisec. The inhibitory potential
ecreased in size along the tissue when one end
f the tissue was stimulated; its spatial decay
as slower than that of the electrotonic potential
n the muscle bundle. Tetrodotoxin (5 x 10^{-7}
/ml) abolished the inhibitory potential without
ffecting the electrical properties of the muscle
embrane. It is suggested that the inhibitory
otential was the result of stimulation of intrin-
ic inhibitory nerves. Properties of the intrinsic
erve fibers derived from these experimental
esults were three-fold: 1) the length of the
erve fibers is probably only a few mm and the
pace constant is of the order of 0.1 mm; 2) no
epetitive firing is produced by a long current
ulse; and 3) the absolute refractory period is
-4 millisec.

764 EFFECTS OF VASODILATORS ON THE ISOLATED
TAENIA COLI OF THE GUINEA-PIG. (E.)
mai, S. (Tokyo Med. & Dent. U., Japan) and
. Takeda. Nature (London) 213(5075):509-510,
967.

uinea pig taenia coli were mounted in a sucrose-
gap apparatus as described by Burnstock and
Straub. Arrangements were made to record isometric
contractions simultaneously with electrical
activity. Nitroglycerine, papaverine hydrochloride,
theophylline ethylenediamine, adenosine and
epinephrine bitartrate all induced qualitatively
similar changes in the membrane potential, i.e.
inhibition of spike discharge and hyperpolariza-
tion, at the same time that they produced relaxa-
tion. The relaxant effect of papaverine and
theophylline ethylenediamine persisted after
complete depolarization by K_2SO_4; the action of
nitroglycerine and adenosine was abolished by
depolarization in a fashion similar to that of
epinephrine. It is suggested that papaverine and
theophylline inhibit the inward movement of Ca
which is believed to be the cause of the tonic
part of K contracture. In contrast, it is
suggested that nitroglycerine, adenosine, and
epinephrine produce a change only in the polarized
membrane, most probably an increase in affinity
towards Ca. The earlier reported relaxation in
depolarized taenia coli by epinephrine was attributed to preservatives present in the commercially available soln. of epinephrine used.

5765 HEMODYNAMICS OF EXPERIMENTAL ACUTE GASTRIC DILATATION. (E.) Engler, H. S. (Talmadge Mem. Hosp., Augusta, Ga.), T. E. Kennedy, L. T. Ellison, J. G. Purvis and W. H. Moretz. Amer. J. Surg. 113(2):194-198, 1967.

In anesthetized, artificially-respired dogs gastric dilatation was produced by air inj. into the stomach through a catheter tied into the esophagus and maintained by ligation of the pylorus. Arterial and venous pressure readings and blood samples were obtained by catheters in the aorta, abdominal inferior vena cava and thoracic inferior vena cava. In each of 23 dogs the av. mean arterial pressure promptly fell after gastric dilatation (50% of control) and remained depressed through the period of dilatation, returning to normal on deflation of the stomach. Abdominal inferior vena cava pressures were elevated during inflation, from a normal 4-5 mm Hg to 20-22 mm Hg. Pressures in the thoracic inferior vena cava and right atrium showed no significant change. In 7 dogs av. cardiac output fell from 1.34 liters/min. to an output of 0.4 liters/min. during dilatation. The av. stroke vol. fell from 6.8 ml/min. to 2.5 ml/min. during dilatation. The av. peripheral resistance was 6.41 before dilatation and rose to 10.6. The data suggest that arterial hypotension accompanying acute gastric dilatation is the result of decreased venous return secondary to mechanical obstruction of the intra-abdominal inferior vena cava, due to external pressure from an acutely distended stomach.

5766 OBSERVATIONS ON INTRAGASTRIC PRESSURE. (E.) Spence, A. A. (Western Infirm., Glasgow, Scotland), D. D. Moir and W. E. I. Finlay. Anaesthesia 22(2):249-256, 1967.

Intragastric pressure was measured in 23 men, 36 children (7 mo.-12 yr. old), 43 nonpregnant women, all for elective surgery under general anesthesia, and 31 pregnant women, at term, for delivery under general anesthesia. Mean intragastric pressure and pressures for the lithotomy, 20° head up, and 20° head down positions in each group were as follows: 1) men: 7.4 cm (H_2O), + 2.2, -1.3 and + 1.6; 2) children: 6.3 cm, + 2.4, -1.7 and + 1.6; 3) nonpregnant women: 7.3 cm, + 2.2, -1.1 and + 2.0; and 4) pregnant women: 13.6 cm, + 5.6, -2.1 and + 3.2. There was no statistically significant difference for any of the first 3 groups for values observed in any 1 position. In pregnant women there was a very large scatter for readings taken in the lithotomy position; 7 of 31 had high absolute values for intragastric pressure when placed in this position: all were greater than 20 cm and one was greater than 60 cm. With 1 exception each of the 7 patients had a special factor that increased abdominal girth beyond the usual value for pregnant women at term (obesity, twin pregnancy or hydramnios). All nonpregnant patients had a mean intragastric pressure of approx. 7 cm which was increased in the lithotomy and head-down positions and decreased in the head-up position; corresponding values for pregnant women were approx. twice those for nonpregnant women. The concept and significance of a critical opening pressure for the cardia is discussed.

5767 VERIFICATION OF THE PHARMACODYNAMIC EFFECTS OF SPARTEINE. INDEFINITE EFFECTS ON INTESTINAL MOVEMENTS IN HUMANS. (It.)

Gaglio, M. (U. Catania, Italy) and F. Marletta. Boll. Soc. Ital. Biol. Sper. 42(14):915-918, 1966.

The effects of the i.v. admin. of sparteine sulfate (0.8-1.2 mg) on small intestine motility were studied in 12 subjects, of whom 3 were normal and 9 had gastritis or chronic gastroduodenitis (4 of 9 with secondary intestinal disturbances). Before treatment, 4 subjects had normal and 8 abnormal initial enterotensiograms. Sparteine had no effect on the 4 subjects with normal initial tracings nor on 5 with hypertensive initial tracings. In 3 patients with chronic gastric disturbances (and hypertensive initial tracings), sparteine-induced sporadic increases in the intraluminal pressure. β-Waves increased from 25-50 mm (H_2O) to 30-70 mm with no change in frequency (approx. 10/min.) but a slight increase in the duration of each single wave (from 5.5 to 6.5 sec.). The above effects began 7-10 min. after inj. and lasted 20-30 min. The author stresses the sporadic and transitory nature of the effects of sparteine and concludes that in no case did the agent induce intraluminal hypotension similar to that observed with ganglionic blocking agents.

5768 MECHANICAL AND BIOELECTRICAL ACTIVITY OF THE STOMACH WALL. (E.)

Papazova, M., K. Boev, K. Milenov and E. Atanassova. Izv. Inst. Fiziol. (Sofiia) 10:15-24, 1966.

Experiments were carried out in conscious dogs by a modification of the inductographic method of Louckes *et al*. and implantation of electrodes along the length of the stomach after the method described by Papazova and Milenov allowing both bioelectric and motor activities to be recorded. Strain gauges similar to those of Jacoby *et al*. were implanted on the stomachs of anesthetized dogs; in some experiments intragastric pressure was also recorded by balloon. Continuous rhythmic contractions of the stomach wall with a frequency of 4-5 min. were observed in fasted dogs. The intensity of the contractions was approx. 1.7 g and corresponding to them were slow polyphase changes of potential in the electrogastromyogram which appeared in the same rhythm. The contractions were blocked by deep narcosis but the potential changes persisted with unchanged rhythm. Groups of spike-potentials following the slow potentials preceded the appearance of high-amplitude contractions (over 2 g). The higher amplitude waves were preceded by a more continuous group of spike potentials of higher frequency and amplitude.

5769 THE EFFECT OF INTEROCEPTIVE STIMULI DIFFERENT DURATION ON THE AFFERENT VAGAL IMPULSATION. (E.)

Varbanova, A. and V. Sokolov. Izv. Inst. Physiol. (Sofiia) 10:2 35, 1966.

Acute experiments were carried out with 35 artificially-respired paralyzed cats. The afferent vagal activity was recorded by an electrode on the distal end of the nerve in th region of the neck. The other vagus nerve was left intact and was prepared for stimulation by placement of a platinum electrode. The stomac was distended by inflation of a balloon introduced p.o. or through a fistula. Both continu (10 min.) and brief (10 sec.) inflations of the stomach with the same pressure produced a simi cycle of changes in afferent vagal activity. A the beginning of the stimulation an inhibition background vagal activity occurred for a short period after which the afferent impulses gradua increased in amplitude and reached their highes values considerably after the termination of th stimulation. Parallel with the increase in amplitude, the frequency of the impulses gradua began to decrease. Having reached a max. ampli vagal activity gradually returned to the background level with "undulatory" phenomena in the process of subsiding. The duration of the cycl of afferent vagal activity increased with the intensity of the stimulation preceding it. The assumption is expressed that the original diste tion of the stomach caused continuous contracti of the smooth muscles which, in turn, causes continuous changes in afferent activity.

5770 THE KINETICS OF ACTION OF ACETYLCHOLI ANTAGONISTS IN SMOOTH MUSCLE. (E.)

Rang, H. P. (U. Oxford, England). Proc. Roy. Soc. [Biol.] 164(996):488-510, 1966.

Two models were proposed to describe the rate-limiting step in recovery of acetylcholine sensitivity in smooth muslce after exposure to atropine or scopolamine: 1) dissociation-limite model, dissociation of drug-receptor complexes; 2) biophase model, diffusion of drug away from the receptors. The theoretical kinetic properti of the 2 models were worked out mathematically with the aid of an analog computer and compared with data collected in experiments carried out on strips of longitudinal muscle of the guinea pig. Contractions were elicited by acetylcholin or 5-methylfurfuryltrimethylammonium or one of several alkyltrimethylammonium bromides prepared (amyl to dodecyl). The kinetic properties of th antagonists applied singly could be explained by either model provided the size of the biophas e a relation to the binding capacity of the ceptors. Interaction of fast- and slow-acting tagonists were accounted for only by the first del. It is concluded that the kinetics of tion of scopolamine and atropine reflect their te of reaction with receptors, and that measurent of antagonist kinetics is a valid guide to ug receptor rate constants. A consequence of e dissociation-limited model, that persistent tagonists would fail to show the classical rallel shift of log-dose effect curves when sted against agonists of low efficacy, was born t experimentally and this effect was used to directly estimate the equilibrium constants of kyltrimethylammonium salts.

71 A BASIC STUDY ON ANASTOMOTIC DISEASE--ACETYLCHOLINE CONTRACTURE OF MUSCLE RIP OF BLIND POUCH. (Jap.) Miyamura, A. apporo Med. Coll., Japan). Sapporo Igaku Zasshi apporo Med. J.) 28(4/5):329-344, 1965.

etylcholine contractions of isolated longitudinal scle strips and histological changes in the testinal pouch wall were studied in dogs. scle strips were placed in a bath soln. conining 25 mM of K ions under 28° C. No difrences were noted in the conc.-response relationips between control and Type 3 blind pouch scle strips. Strips from a Type 2 blind pouch re much more reactive to acetylcholine than ose from controls; Type 1 blind pouch muscle rips were less reactive to acetylcholine than ntrols. Acetylcholine contractions were depennt upon K conc.; when K conc. were increased om 5 to 40 mM, the height of contraction was adually reduced in both control and blind pouch scle strips. Control and Type 3 pouch strips re dependent to the same degree on K conc.; the esponse of Type 2 blind pouch strips to high nc. of K was somewhat weaker than that of ntrols, while Type 1 blind pouch muscle strips d a much greater reduction of acetylcholine ntractions than control strips when high conc. K ions were used. There were more remarkable egenerative changes in Auerbach's nerve cells d in muscle cells according to the following rder: Type 3 <Type 2 <Type 1. The two muscle ayers became thickened during the development the blind pouch.

772 INHIBITION OF GASTROINTESTINAL MOVEMENT BY SYMPATHETIC NERVE STIMULATION: THE ITE OF ACTION. (E.) Gershon, M. D. (U. Oxford, ngland). J. Physiol. (London) 189(2):317-327, 967.

he mechanism of sympathetic nervous inhibition f gastrointestinal movement was studied in guinea igs and rabbits in order to determine if the rimary action of sympathetic nerve stimulation as on ganglia or on the smooth muscle itself. he effect of sympathetic nerve stimulation did ot resemble the effect of ganglionic blockade r that of removing all nervous tone with tetrodotoxin. The same frequency of sympathetic nerve stimulation to the rabbit jejunum, which inhibited myogenic spontaneous activity, blocked excitatory responses to transmural postganglionic cholinergic nerve stimulation and antagonized contractions in response to drugs acting directly on the smooth muscle. The output of acetylcholine was measured as an indicator of postganglionic nervous activity. In contrast to hexamethonium, stimulation of sympathetic nerves at frequencies of stimulation sufficient to relax the muscle did not reduce acetylcholine output. Sympathetic nerves and vagus nerves to the guinea pig stomach were stimulated individually and simultaneously in the presence of hyoscine. The relaxant responses to stimulation of the 2 nerves summated when they were stimulated simultaneously; this indicated that the transganglionic vagal pathway was not blocked. It is concluded that the effect of sympathetic nerve stimulation is due to the direct action of the released norepinephrine on the smooth muscle.

5773 ATROPINE-LIKE PROPERTIES OF HEMICHOLINIUM-3. (E.) Bertolini, A. (U. Modena, Italy), A. Greggia and W. Ferrari. Life Sci. 6(5):537-543, 1967.

In vitro studies were performed with guinea pig ileum, atria, and uterine horns, rabbit ileum and frog rectus muscle using standard organ bath procedures. *In vivo* experiments were performed in cats. Internal pressure was recorded from jejunal loops, arterial pressure from femoral artery and respiration from a trachial transducer. Hemicholinium-3 (HC-3) *in vitro* antagonized reversibly and selectively the action of acetylcholine on the terminal ileum, the uterine horn and the isolated atrium of the guinea pig. It also antagonized the action of acetylcholine on the isolated rabbit ileum, but only slightly depressed the response to acetylcholine of the frog rectus muscle. The antiacetylcholine action of hemicholinium on guinea pig ileum was not prevented by choline. In the anesthetized cat, hemicholinium suppressed the effect of carbacholine on the intestine, but did not modify the effect on arterial blood pressure. These findings appear to support the hypothesis of an affinity of HC-3 for acetylcholine-binding sites not only pre- but also postsynaptically. HC-3 was considered as the most reliable means for biologically distinguishing acetylcholine from bradykinin.

5774 PRELIMINARY NOTE ON THE CONTRIBUTION OF CINEFLUOROGRAPHY AND THE VIDEO RECORDER TO THE STUDY OF THE PHYSIOLOGICAL BEHAVIOR OF THE ANTRAL REGION OF THE STOMACH. (E.) Vicari, F., R. Dornier, P. Gaucher, P. Arnould and F. Heully. Medicamundi 11(4):134-138, 1966.

Using radiological observation with image intensification and videotape recording 25 subjects were studied in order to make a descriptive analysis of the motility of the antral region and the adjoining gastric and duodenal zones. Fasted subjects were given a standard Ba meal at a set time. The Ba meal reached the stomach as an interrupted jet; in 7 of 25 cases some material immediately passed the pylorus. Active movement of the stomach started after a latency of 2-3 min. The waves of contractions allowed 2 zones in the stomach to be recognized, the vertical part (digestive sack) and the horizontal (excretory canal). In the digestive sack regular peristalsis occurred. The excretory canal by contracting at both ends isolated a certain amount of Ba in a systolic action. Occasionally after a systole a stream of Ba passed through the pylorus (usually 7 min. after the meal). Occasionally the Ba passed as a stream. Passage of the meal through the duodenum occurred 1) without slowing or fractionation, 2) occasional stops, for example, at the inferior bend, 3) occasional reflux to a previous segment by a violent contraction. A periodicity was observed in the development of all these movements. Complete emptying occurred on the av. after 140 min.

5775 DIGESTIVE TRANSIT TIME AND OPEN-FIELD BEHAVIOR OF RATS. (E.) Tobach, E. (Amer. Mus. Nat. Hist., New York City), H. S. Berman, P. S. Gold, K. Thomas and R. Haber. Physiol. Behavior 1(2):125-131, 1966.

Wistar-strain male and female rats were fed food pellets similar in size and shape to common rat chow, but containing a 5% conc. of chromic oxide. Boluses were collected at approx. 20 min. intervals to determine the digestive transit time. Digestive transit time was defined as the time between ingestion of the treated food and the initial appearance of a significant conc. of chromic oxide in the animal feces. In comparing the individual transit time before open-field experience, there was no correlation with open-field defecatory behavior. However, open-field experience significantly decreased transit time. A positive correlation between post-cecal length and digestive transit time in the open-field group suggested that the effect of the open-field was to increase mobility and shorten digestive transit time by shortening the pathway. Open-field experience affected both sexes differently; males not placed in the open-field tended to have longer transit time than females. In the group observed in the open-field, the transit time of males tended to become shorter, but female transit time increased, so that the male-female differences in transit time became non-significant. It is suggested that digestive transit time is useful as a dependent variable in studies of stress and emotional behavior.

5776 THE ACTION OF THROMBIN AND OTHER PROTEOLYTIC ENZYMES ON THE SMOOTH MUSCLE OF DIFFERENT ORGANS. (Ger.) Haustein, K. O. (Pharmacol. Inst., Erfurt, Germany) and F. Markwardt. Arch. Int. Pharmacodyn. 163(2):393-402, 1966.

Strips of thoracic aorta and the posterior ven
cava of the rabbit were mounted in 10 ml baths
in continually oxygenated Tyrode soln.; the
recordings were made at a magnification of 12
times. Uteri excised from infant rats 80-100
strips of guinea pig ileum also mounted in 10
baths, the uteri in de Jalon's soln. and the
ileum in Tyrode's, both oxygenated, were also
used to test the effect of thrombin and other
proteolytic enzymes on smooth muscle. Kymogra
records were made at a magnification of 6 time
Altogether, thrombin, prothrombin, hirudinin,
trypsin, α-chymotrypsin, papain, plasmin,
subtilisin, streptokinase, protease inhibitor
(from beef lungs), and bradykinin were the
enzymes tested upon the smooth muscle preparat
described above. A number of other compounds,
among them dibenamine, dihydroergotamine, LSD$_{2}$
and serotonin were used in conjunction with th
enzymes in some tests. Only thrombin and tryp
caused contraction of smooth muscle in the 4
preparations. Thrombin and trypsin potentiate
the action of epinephrine, norepinephrine,
serotonin and bradykinin on smooth muscle.
Contractions of the ileum induced by either of
the 2 enzymes were inhibited by pretreatment o
the muscle strips by antihistamine drugs or by
drugs or agents which liberate histamine from
the muscle tissue. The inactivation of thromb
by warming to 60° for 10 min. or by phosphoryl
tion caused loss of ability to stimulate smoot
muscle. Hirudinin, a thrombin inhibitor, pre-
vented thrombin from causing contraction of sm
muscle but hirudinin did not affect the abilit
of the muscle to respond to other stimuli.
Tryptic action on smooth muscle was affected i
the same way as the activity of thrombin by
heat denaturation, and phosphorylation, the
presence of antihistamines and protease inhibi

5777 MODIFICATIONS OF THE ELECTRICAL ACTI
OF THE SMALL INTESTINE UNDER ELECTRI
STIMULATION. STUDY IN THE RAT. (Fr.)
Rougereau, A. (Fac. Med., Tours, France) and
J. Thouvenot. C.R. Soc. Biol. (Paris) 106(8-9)
1699-1703, 1966.

Transverse electrical stimulation (3-150 sec.)
of the rat duodenum with a positive current
induced partial fusion of the slow waves withou
a modification of periodicity; negative current
induced marked changes in periodicity and
amplitude. In the jejunum, longitudinal stimul
tion caused more marked abnormalities of the
amplitude and frequency of contractions; unlike
the changes induced by transverse stimulation,
these aberrations persisted after stimulation
was stopped. Prolonged stimulation by a negati
current completely disrupted the contractions.
Stimulation of the secretion of some local fact
(serotonin, villikinin, bradykinin) during
longitudinal electrical stimulation is suggeste
as a possible mechanism for the prolonged distu
ances noted.

5778 GASTRODUODENAL REFLEX IN THE RAT. CONDITIONS UNDER WHICH IT APPEARS.

-.) Harichaux, P. (Fac. Med. Pharm., Tours, nce) and J. Moline. C. R. Soc. Biol. (Paris))(8-9):1703-1705, 1966.

rats with duodenal distention (produced by eral methods) 3-8 cm below the pylorus, gastric flow was reduced, but it remained cyclic and complete spasm was sometimes seen. The response peared after a 20-30-sec. lag period and usually rsisted throughout the time of distention. Some sponses were seen only after repeated stimula- on. Under some conditions, when the stimulus s not cyclic, duodenal distention regularized d moderated gastric output, restoring its ythm (5 cycles/min.) and therefore increasing loric tonus. It is concluded that vagotomy the level of the neck preserves the gastro- odenal reflex, as does i.v. atropine or duodenal ction at the level of distention.

79 COMPARATIVE X-RAY AND ANATOMIC STUDIES OF THE CAT SMALL INTESTINE PRETREATED TH PILOCARPINE WITH REGARD TO THE ORIGIN OF E RELIEF PICTURE OF THE MUCOSA. (Ger.) Lenz, H. . Clin. Bonn, Germany) and H. Brünner. Fortschr. ntgenstr. 106(2):261-271, 1967.

ts were fasted 24-48 hr. before experimentation der anesthesia and then were given 100-150 ml Ba gastric intubation; after the jejunum was lled with contrast material, 0.5-1.0 mg/kg of locarpine was inj. i.m. The effects were served by fluoroscopy and X-ray cinematography. e stimulation of the secretory parasympathetic means of pilocarpine causes an edematous infil- ation of the wall with stoppage of intestinal tility. As a rule, a short time after the set of the hypersecretion, the animal dies from e toxic effects of the drug. Postmortem stologic examination was also made. Ten min. ter the i.m. inj. of pilocarpine the distal op of the jejunum showed a narrowing of the men and an uneven folding of the mucosa parallel a transverse section. The outer border of the oximal loop was lightly notched. The inj. of 25 mg/kg of pilocarpine i.m. caused a great crease in tone followed by peristaltic waves. e secretory stimulation caused a hypersecretion th dilution of contrast medium. The movement fluid into the wall of the intestine brought e mobility to a halt. In the phase of akinesis, e cross markings reached their limit. The lief structure was especially well developed the secretion-filled intestine. The mucosa owed broad swollen cross folds separated by ep grooves. These relief structures remained r some time after death; they were not uniform, eing present in thin-walled sections and much less prominent in opened sections. Histologically the swelling of the mucosa and villi and edema of the wall were most striking. The circular muscle or "ring muscle" when contracted is largely responsible for the cross markings, whereas the muscularis mucosae are gathered into the roofs or higher parts of the mucosal folds. The extreme contraction of the intestinal smooth muscle resulting from pilocarpine causes a shortening of the small intestine, throwing the mucosa into folds accentuated by the edematous swelling.

5780 STUDIES ON THE CAFFEINE CONTRACTURE OF RAT INTESTINAL SMOOTH MUSCLE. (Jap.) Sunano, S. (Sapporo Med. Coll., Japan). Sapporo Igaku Zasshi (Sapporo Med. J.) 29(3/4):220-225, 1966.

Caffeine contracture of longitudinal strips of the rat large intestine was studied under conditions where excitation-contraction coupling was intercepted. In sucrose-Ringer's soln., where all NaCl in ordinary Ringer's soln. was substituted with equivalent sucrose, caffeine (6 mM) induced contracture of the muscle, even to a greater degree of tension than that in ordinary Ringer's soln., while mechanical responses of the muscle to electrical stimulations were abolished in the sucrose-Ringer's soln. In lithium chloride-Ringer's soln. (lithium chloride instead of NaCl), the caffeine contracture was observed almost in the same manner as that in ordinary Ringer's soln., but the responses to electrical stimulations were not observed. Both responses to caffeine and electrical stimulation were abolished by the addition of 0.04-0.2 mM of dinitrophenol to ordinary Ringer's soln. In hypertonic NaCl-Ringer's soln. (1.75-2.5 times of ordinary NaCl conc.), both responses disappeared. The same inhibition of both responses was also observed in hypertonic sucrose-Ringer's soln., where 328 mM of sucrose was added to ordinary Ringer's soln.

5781 EFFECT OF SEROTONIN ON THE SMOOTH MUSCLES OF THE CIRCULATORY SYSTEM AND ALIMENTARY TRACT OF RAT AND GUINEA PIG. (E.) Gawęcka, I. (Sch. Med., Warsaw) and W. Kostowski. Acta Physiol. Pol. 17(1):129-137, 1966.

5782 BEHAVIOR OF GASTRIC MOTILITY DURING APPLICATION OF THERMIC STIMULATION TO THE EPIGASTRIC REGION. (ENDOSCOPIC OBSERVATION). (It.) Mazzone, O. (U. Catania, Italy) and A. Blasi. Arch. Ital. Mal. Appar. Dig. 33(2):185-188, 1966.

See also abstract nos.: 5628,5722,6037,6051,6228

5783 SUBMICROSCOPIC STRUCTURE OF LIVER CELLS AFTER ALTERATION OF THEIR SECRETORY RATE.

(Ger.) Dvořák, M. (U. Purkyne, Brno, Czechoslovakia) and D. Horky. Z. Zellforsch. 76(4):486-497, 1967.

Mature female rats (180-200 g) were separated into 3 groups; Group 1 (controls, 4 rats, of which 2 received 0.5 ml paraffin oil p.o.); Group 2 (12 rats) received a single dose of a choleretic each; Group 3 (12 rats) received the choleretic for 4 days; in Groups 2 and 3 half the animals also received sodium dehydrocholate in a single 20-mg dose i.m., the other half 1-phenylpentanol in a single 10 mg dose in 0.5 ml paraffin oil, p.o. The animals were killed 90 min. after the last admin. of drug. Under the electron microscope the liver cells of animals which had received single or multiple doses of a choleretic agent showed submicroscopic changes in the cytoplasm; the nuclei showed their usual ultrastructure; the av. nuclear diameter had, however, been enlarged in the experimental animals which has been observed in liver cells when the rate of bile secretion has been increased; no measurements were given. The most evident morphological changes brought about by hypersecretion were observed in the Golgi complex, the lysosomes, and mitochondria. Alterations appeared also in the bile capillaries. Under the electron microscope no changes were seen in the endoplasmic reticulum, ribosomes, and cell inclusions. On the basis of these observations as well as those reported by others, the most active structures in the secretion of bile are the Golgi complex, the lysosomes and mitochondria. It seems possible that bile is extruded through the cell membrane.

5784 EFFECT OF CORTISONE ON ^{131}I-THYROXINE IN LIVER AND BILE.

(E.) Blomstedt, B. (Karolinska Hosp., Stockholm) and J. Einhorn. Acta Radiol. [Ther.] (Stockholm) 4(6):437-445, 1966.

The effect of cortisone (5 mg or 10 mg) on the total amount of thyroxine in the liver, on the excretion of thyroxine with the bile and on the relationship between total thyroxine and the amount conjugated to the glucuronic acid in liver and bile was studied in 48 male Sprague-Dawley white rats. The specific activity of ^{131}I-thyroxine used was 24-48 mc/mg; a dose of radioactivity of 6 μc/100 g rat wt. was admin. as a single i.m. inj. to each rat. The mean total radioactivity in the liver of 10 control rats sacrificed 9 days after ^{131}I-thyroxine admin. was 3322 ± 165.4 cpm and in 10 cortisone-treated rats, 2466 ± 157.2 cpm, a statistically significant difference. The difference was also significant when the radioactivity/g liver tissue was calculated (298 ± 25.9 cpm and 190 ± 10.5 cpm, resp.) and when the liver radioactivity was calculated in relation to the ^{131}I-dose admin. Approx. 16.5% of the radiothyroxine in the liver was bound to glucuronic acid in liver extracts from control rats sacrificed 72 hr. after admin. of ^{131}I-thyroxine; the corresponding value for rats receiving cortisone was 8.6%. The amount of thyroxine glucuronide, in relation to the tota radioactivity detected in the liver, in all pa was less for the cortisone-treated rat than fo the control; this difference was also statisti significant. Cumulative excretion of radioactivity with the bile between control and cortisone groups showed no significant difference Radiothyroxine in bile was conjugated to glucu acid to a much greater extent than that in the liver; approx. 95% of radiothyroxine in the bi in both the cortisone and control rats was cor jugated to glucuronic acid. These findings su gest that large doses of cortisone accelerate thyroxine release from the glucuronic acid in the liver and influence the excretion of thyro to the blood.

5785 THE FIRST TEN DAYS OF LIVER REGENERA TION AFTER RADICAL HEPATECTOMY IN TH DOG.

(Fr.) Mallet-Guy, P. (Edouard Herriot Hosp., Lyon, France) and N. Chanelière. Lyon Chir. 62(6):801-819, 1966.

In the first 6-7 days after 75% hepatectomy in dogs, liver regeneration (measured by liver wt progressed steadily (50% at 3-4 days, 86% at 6-7 days) and liver wt. remained relatively stabilized until day 10. After day 10, howeve changes in liver wt. varied widely (50-120% at about 21 days). Tracer studies with ^{198}Au sho that these differences resulted from shrinkage of the liver parenchyma in some animals, an irregular and sometimes reversible reaction. SG values were above normal in 6 of 7 dogs with s normal liver regeneration; this was the most reliable biochemical index of regeneration. Histological changes during regeneration were typical, but some animals developed steatosis, glycogen deposition and fibrous changes.

5786 RESPONSE OF THE ISOLATED PERFUSED LI TO THE ADDITION OF FATTY ACIDS.

(Fr Vaisler, L. (Inst. Endocr., Bucharest), E. Costiner and E. Dinulesco. Rev. Roum. Endocr. 4(1):31-34, 1967.

In isolated perfused rat liver, free fatty aci were released into the medium after a 60-min. lag, increasing markedly and steadily to 180 m Following the addition of sodium palmitate, fa acid release decreased sharply in the first 30 min. and fell more slowly to 180 min., then increased slightly until 240 min. The initial decrease (90 min.) was interpreted as uptake o free fatty acids by the liver, with an equilib in the next 90 min. and slight release of free fatty acids at 180-240 min. An autoregulatory mechanism to maintain plasma free fatty acid levels is suggested.

37 EFFECT OF MUSCULAR WORK ON BILE FLOW AND COMPOSITION IN THE RAT. (Fr.)

perray, B. and H. Pacheco. C. R. Acad. Sci.
aris) 263(23)(Ser. D):1887-1890, 1966.

le flow, studied in rats immediately after the
d of an exercise period (1 hr./day for 3 wk.)
after a 24-hr. rest period, was increased to
9% and 106% of control values, resp. Cholic
id composition was substantially unchanged,
t chenodeoxycholic acid output and bile content
re increased in rats studied immediately after
ercise (165% and 143% of control values, resp.);
rats studied after 24 hr. of rest, chenodeoxy-
olic acid output was significantly increased
39% of control values), but its content was not
gnificantly changed (124% of control values).
olesterol content was not significantly af-
cted in either group, or cholesterol output
ter 24 hr. of rest, but cholesterol output
mediately after exercise was significantly in-
eased (135% of control values). The increase
liver cholesterol output seemed to be partially
mpensated by an increase in biliary cholesterol
vels; it was directly related to the amount of
rk done but also seemed to be an indirect, par-
al consequence of food intake in the animals
ter exercise (although all animals were studied
ter a 24-hr. fast).

788 COMPARATIVE STUDY OF FREE AMINO ACIDS IN THE SERUM AND BILE IN LIVER DISEASES
METHOD OF EXAMINATION OF AMINO ACID METABOLISM).

Fr.) Popesco, A. (Inst. Med. Pharm., Cluj,
umania), G. Benga, D. Coman and V. Pop. Rev.
nt. Hepat. 16(8):1419-1428, 1966.

n normal human bile (10 subjects), lysine, serine,
spartic acid, asparagine, threonine, glycine,
eucine, and isoleucine levels were above serum
alues; arginine and histidine were lower, while
ystine, proline, tyrosine, tryptophan and meth-
onine were sometimes present. No quantitative
hanges in serum or biliary amino acids were seen
n patients with biliary dyskinesia (8) or healed
cute infectious hepatitis (4). In active chronic
epatitis (5 cases), serum cystine, lysine,
rginine, and histidine rose; serum valine de-
reased; in the bile, valine increased and cystine
as absent, while lysine, arginine and histidine
decreased. In evolutive chronic hepatitis (5
cases), serum phenylalanine sometimes increased
and biliary amino acids (lysine, arginine, his-
tidine, serine, phenylalanine, leucine, glycine,
valine) increased. In liver cirrhosis (7 cases),
serum tyrosine and phenylalanine rose; in the
bile, alanine and leucine rose, while lysine,
threonine, glycine and phenylalanine fell. In
hepatic steatosis with obstructive jaundice (3
cases), biliary lysine, histidine, glycine,
valine, aspartic acid, glutamine and isoleucine
disappeared, but no significant changes were noted
in serum amino acids. In porphyria cutanea tarda
(8 cases), serum lysine, alanine, phenylalanine,
isoleucine, leucine, proline and hydroxyproline
rose; in the bile, lysine, alanine, isoleucine,
proline and hydroxyproline were increased, while phenylalanine fell. Biliary amino acid levels differed according to the source of the bile.

5789 EFFECT OF OXYTOCIN ON VARIATIONS OF GLUCOSE AND FREE FATTY ACIDS. STUDY IN ISOLATED PERFUSED LIVER IN VITRO. (Fr.)

Milcou, S. M. (Inst. Endocrinol., Acad. RPR, Bucharest, Rumania), L. Vaisler and E. Costiner. Rev. Int. Hepat. 16(8):1369-1375, 1966.

During 180 min. of incubation, glucose levels in the medium progressively decreased (by about 50%) and free fatty acids increased (by about 100%, especially in the last 90 min.). In rat liver preparations treated with oxytocin (500 mU) after 90 min. of incubation, glucose levels in the medium rose about 15% within 10 min., remained at this level for 30 min., then fell to control levels by the end of the study. Free fatty acid levels remained stationary for the first 30 min. after treatment, then rose (more slowly than in control preparations) in the next 30 min., then fell from 150-180 min. of incubation. A direct action of glycogen on hepatic glycogen is suggested.

5790 THE UPTAKE OF FIBRIN AND FIBRIN-DEGRADATION PRODUCTS BY THE ISOLATED PERFUSED RAT LIVER. (E.)

Gans, H. (U. Minnesota Sch. Med., Minneapolis) and J. T. Lowman. Blood 29(4):526-539, 1967.

The uptake of ^{75}Se-labeled rat fibrin and a specific preparation of fibrin degradation products by an isolated, perfused liver was investigated. The rapid phase $t^{1/2}$ for fibrin in the perfusate was approx. 9 min.; this was comparable to that found for aggregated ^{131}I bovine serum albumin and colloidal Au in the same system. Loss of activity from the blood closely paralleled the increased activity recorded in the liver. No radioactivity was found in the bile samples or the trichloroacetic acid-soluble fraction of plasma. Microradioautographs of washed liver tissue after the labeled, fibrin perfusion suggested the presence of the label on or in the Kupffer cells. Labeled rat fibrin preparations, digested by the action of "cold" rat plasmin to a distinct endpoint, contained 3 distinct fractions on paper electrophoresis. Addition of these fractions to the perfusate resulted in approx. 25% clearance of radioactivity over a 3-hr. period. Thus, clearance of this specific fibrin degradation product preparation occurred at a much slower rate than that of fibrin; the $t^{1/2}$ was in excess of 12 hr. These results apparently confirm Lee's observation that cells of the reticuloendothelial system are involved in the elimination of free circulating fibrin and its metabolic products.

5791 THE EFFECT OF AMMONIUM CHLORIDE ON THE RNA CONTENT OF THE RAT LIVER. (E.)

Basch, A. (Univ. Med. Sch., Szeged, Hungary) and F. Joó. Acta Med. Acad. Sci. Hung. 23(1):7-13, 1966.

Inbred male albino rats were given ammonium chloride (NH_4Cl; 0.1 g) every second day over a period of 20 days. Subsequent histochemical staining showed increased pyroninophilia, while electron microscopy demonstrated an enriched ergastoplasm in the liver cells. Both findings suggested an increased RNA content in the liver, which was quantitatively measured as a 24.8% increase. The data suggest that NH_4Cl treatment led to increased intrahepatic protein synthesis.

5792 REGENERATION OF THE MAMMALIAN LIVER. V. MITOTIC DIVISION IN CYTOLOGICALLY DIFFERENTIATED LIVER CELLS.

(E.) Lane, B. P. (New York U. Sch. Med., N. Y.) and F. F. Becker. Amer. J. Path. 50(3):435-445, 1967.

After a 70% hepatectomy in the rat (male albino Sprague-Dawley), residual liver tissue entered a period of cell division which resulted in replacement of the excised liver mass. During the early period after surgery, hepatocytes underwent extensive morphologic simplification of both surface structures and cytoplasm. Normal structural components were reconstituted very rapidly between the ninth and fourteenth postoperative hr. This restoration resulted in a cell almost identical to an unstimulated hepatocyte, even though nucleic acid synthesis and the subsequent steps in preparation and participation in mitotic division were occurring. However, transient cytoplasmic degradation was detected at the time of DNA synthesis and was again followed rapidly by total cytoplasmic reconstruction. The presence of lysosomes in the perinuclear area during cytokinesis was confirmed.

5793 THE EFFECT OF CHOLECYSTOKININ-PANCREOZYMIN PREPARATIONS ON HEPATIC BILE OUTPUT IN FASTING AND DIGESTING DOGS.

(E.) Jonson, G. (Karolinska Hosp., Stockholm, Sweden), G. Svartengren and L. Thulin. Acta Physiol. Scand. 69(1-2):23-28, 1967.

Three adult mongrel dogs were cholecystectomized and provided with a permanent external 2-part common duct fistula. The output of hepatic bile during infusion of cholecystokinin-pancreozymin preparations was studied during fasting, during digestion of food with bile and during infusion of dehydrocholic acid. Biological activity of all the preparations was approx. 200 Ivy dog U of cholecystokinin, 800 Crick, Harper and Raper U of pancreozymin and 10-12 clinical U of secretin/mg; with infusions, the secretin dose never exceeded 1 clinical U/kg body wt. and hr. (below the threshold for choleretic effect). In the fasting state with no infusion the bile output was equal to initial values; infusion during fasting doubled bile output. During digestion with no infusion, bile output was increased 3-4 times over initial values. Infusion during digestion gave either a decrease of output or an initial increase followed by a decrease. During fasting with dehydrocholic acid infusion, bile output was 6 times greater than initial values, and with superimposed hor monal infusion, output was increased further b approx. 15%. These patterns appeared to be re lated to the gastric and duodenal activity dur the experiments. It is concluded that physiologic or pharmacologic interventions on hepati bile output should be evaluated only when side effects on gastrointestinal motility and secre tion can be excluded.

5794 THE DISTRIBUTION OF BILE SALTS ALONG THE SMALL INTESTINE OF RATS.

(E.) Eastwood, M. A. (Roy. Infirm., Edinburgh, Scotland) and G. S. Boyd. Biochim. Biophys. A 137(2):393-396, 1967.

Wistar rats were fed a low-bulk stock diet (70 wholemeal flour, 25% skimmed milk powder and 5 brewer's yeast) and water freely. Alterations of this diet included substitutions of 10% cellulose (5 rats, 2 experiments); 25% cellulose (3 rats, 1 experiment); 10% sodium carboxymethy cellulose (3 rats, 1 experiment) and all regime were maintained for at least 10 days prior to sacrifice. The effects of the various regimens on the dihydroxy and trihydroxy bile acid conte were measured. Rats were opened by abdominal approach and the small intestine clamped at the ileocecal valve prior to dividing the small intestine into 4 equal parts. Contents from ea intestinal segment were freely drained into centrifuge tubes and centrifuged for 45 min. at 2600 x g. Animals on a stock diet only showed a biphasic distribution of a pellet [solid component] and supernatant both of which increased quantitatively along the intestine per each quarter segment. Rats fed carboxymethyl-cellul and cellulose showed increases in the pellet an supernatant phases, resp. A progressive increa in trihydroxy acid conc. in the first 3 quarter and a substantial decrease in its conc. in the fourth quarter was observed in rats fed a stock diet. The same results were obtained for all other diets, except 25% sodium carboxymethylcellulose. A similar decrease between the thir and fourth quarters was noted for dihydroxy aci conc. in rats fed a stock diet except that it was limited to the supernatant phase. In rats fed other regimens, a uniform decrease in dihydroxy acid conc. was obtained along the length the small intestine. It is concluded that intestinal bile salts are partitioned between non absorbable bulk and the aqueous phase and are closely related to the water content of the intestinal segment. An increase in polysaccharid in the diet (as in cellulose-fed rats) results in an increased bile salt content of the small intestine (supernatant phase).

5795 BINDING OF SULFOBROMOPHTHALEIN SODIUM (BSP) AND OTHER ORGANIC ANIONS BY ISOLATED HEPATIC CELL PLASMA MEMBRANES IN VITRO.

(E.) Cornelius, C. E. (Kansas State U., Manhattan), J. Ben-Ezzer and I. M. Arias. Proc. Soc. Exp. Biol. Med. 124(2):665-667, 1967.

lated, hepatic cell plasma membranes (rat)
nd, on the av., 160 ± 2 µg BSP/mg of membrane
tein and 1.4 ± 0.1 µg BSP/U of Co^{+2}-cytidine
ophosphatase activity. BSP binding was con-
nt between pH 7-8, but increased binding oc-
red at lower pH's. BSP binding was max. at
µg BSP/ml in the incubation mix, while pro-
tionately less binding was seen at lower conc.;
conc. above 500 µg/ml reduced BSP binding and
sed dissolution of cell membranes. Max. BSP
ding was complete by 3 min. and did not in-
ase on incubation up to 120 min. Addition or
stitution of Ca, Mg, K and Cl ions to the
ffer system at 0.05 M did not enhance BSP
ding; however, binding was greatly depressed
substitution of distilled H$_2$O for the Na$_3$PO$_4$
ffer. Fluorescein, taurocholate and bilirubin,
ich do not compete for hepatic uptake with BSP
en inj. simultaneously in vivo, had little or
interference with BSP binding by hepatic cell
asma membranes in vitro. Other organic ions,
ch as indocyanine green, flavaspidic acid gluc-
inate and iodipamide methyl glucamine, which
mpete with BSP for hepatic uptake in vivo, sig-
ficantly reduced BSP binding by isolated mem-
anes in vitro; the av. per cent interference with
P binding by these 3 agents was 51%, 64% and
%, resp.

96 INFLUENCE OF PROTRACTED INFUSION OF
GLUCOSE AND INSULIN ON THE COMPOSITION
D REGENERATION ACTIVITY OF LIVER AFTER PARTIAL
PATECTOMY IN RATS. (E.) Šimek, J. (Charles U.,
adec Kralove, Czechoslovakia), V. Chmelař, J.
lka, J. Pazderka and Z. Charvat. Nature (London)
3(5079):910-911, 1967.

le rats were subjected to partial hepatectomy
esection of 65-70% of the liver) and then
vided into 4 groups. Group 1 included normal
ts in which the rest of the liver remaining
fter partial hepatectomy was analyzed. Rats in
oup 2 were given an infusion of Ringer's soln.,
ts in Group 3 were given 20% glucose (in Ringer's
ln.) and in Group 4, they were given 20% glu-
se containing 0.02 I.U. of crystalline insulin/ml.
nfusion was done for 5 min. each hr. at a dose of
.3 ml/100 g body wt. Two hr. before sacrifice,
ritiated thymidine (200 mc/0.4 ml/200 g) with a
pecific activity of 6.0 c/mmole was inj. The
ncorporation of thymidine-^{3}H into liver cell
uclei was monitored, and the mitotic index
number of mitoses found in 10^{3} nuclei of paren-
hymal liver cells) was ascertained. Thirty-four
r. after partial hepatectomy there was a smaller
ncrease in the wt. of liver that remained after
esection, and also a smaller total amount of
ipids, protein nitrogen, RNA and DNA in the
iver tissue of rats which received insulin and
lucose than in those of the other experimental
roups. In addition, values of the mitotic index
ere considerably lower and the number of nuclei
f parenchymal liver cells labeled with thymidine-
H were decreased in rats that received both in-
ulin and glucose. Insulin admin. with glucose
ncreases lipogenesis, especially in the adipose tissue, and at the same time inhibits the liberation of free fatty acids from this tissue. Slackening of the growth of the lipid content in the liver probably is connected with the limited mobilization of free fatty acids from the fat deposits which usually occur after partial hepatectomy. It is thought that as a consequence of the partial inhibition of the growth of lipids in the liver, a shift of liver metabolism occurs, and that the decrease in the regenerating activity of the liver which was observed is probably related to the inhibited development of these changes.

5797 CATABOLISM OF TRYPTOPHAN BY THE ISOLATED, PERFUSED LIVER AND INTESTINE. (E.) Altman, K. I. (Euratom, Mol, Belgium) and G. B. Gerber. Nature (London) 213(5079):911-913, 1967.

The catabolism of tryptophan by the isolated, perfused liver and intestine of the rat was studied using a perfusion fluid of 40 ml of fresh, heparinized rat blood diluted with a third of its vol. of Ringer's soln. and containing 200 mg of glucose. Tritiated L-tryptophan and DL-tryptophan (indolyl-2-^{14}C) labeled with ^{14}C were used in all experiments. Animals were fed a standard diet that contained all of the important vitamins, including 6.5 mg/kg of pyridoxine, and they were starved for 18 hr. before perfusion. Perfusions were done either at physiological conc. of tryptophan (4 µmoles) or in conditions of tryptophan loading after addition of 50 µmoles of L-tryptophan to the perfusion medium. In the liver catabolism of tryptophan occurred rapidly, primarily by way of the kynurenine pathway, resulting in formation of compounds devoid of ^{14}C. Substantial quantities of tryptophan metabolites were excreted into the bile, but some of these were devoid of ^{14}C and contained only tritium; 1 of the main products of excretions in the bile was tentatively identified as 3-hydroxyanthranilic acid. Initially tryptophan disappeared more slowly in conditions of tryptophan loading, but its catabolism increased as the perfusion progressed, possibly due to induction or activation of tryptophan pyrrolase after addition of 50 µmoles of L-tryptophan. Approx. 20-30% of total activity of ^{14}C was present in protein-bound serine and alanine after 2 hr. of perfusion. Tryptophan catabolism by the kynurenine pathway was very small in the intestine; in contrast to liver, there was no loss of ^{14}C and no detectable formation of tritium oxide. However, the formation of at least 1 tryptophan metabolite, tentatively identified as indole acetic acid, was noted.

5798 RELEASE OF AN ESTERASE FROM LIVER UPON HEPARIN INJECTION. (E.) De Meis, L. (U. Brazil, Rio de Janeiro) and R. Maroja. Quart. J. Exp. Physiol. 52(2):174-183, 1967.

Heparin induces the release of an esterase from liver. Several organs were perfused with in vitro heparinized blood (500-800 I.U. per cent), and esterase activity was measured manometrically in a Warburg apparatus. Postheparin esterase was differentiated from the pseudocholinesterase normally found in plasma by its resistance to prostigmine. Clearing-factor activity was measured by the decrease of plasma turbidity in the presence of dog chyle. Attempts were made to differentiate post-heparin esterase from the clearing factor. Heart-lung and hind limb perfusions with *in vitro* heparinized blood caused release of clearing factor into the perfusion medium, but no postheparin esterase activity was found. Liver perfusion with *in vitro* heparinized blood released both clearing factor and esterase; max. esterase activity was obtained after 2-4 min. of perfusion. The presence of heparin was required for the release of esterase, since perfusion with citrated blood did not release the enzyme. Perfusion of liver with a suspension of RBC in saline-glucose-heparin soln. released postheparin esterase, but no clearing factor activity was found. Perfusion with a similar mixture without heparin did not release the esterase. Extracts of heart powder with *in vitro* heparinized plasma exhibited only clearing factor activity. Postheparin esterase was strongly inhibited by protamine sulfate and was capable of hydrolyzing several low molecular wt. esters.

5799 COPPER CONTENT AND DISTRIBUTION IN SUBCELLULAR FRACTIONS OF LIVER FROM NORMAL AND COPPER SULPHATE TREATED RATS. (E.)

Roussanov, E. and P. Balevska. *Izv. Inst. Fiziol. (Sofiia)* 10:163-169, 1966.

Male albino rats (40) were divided into a control group (19) and an experimental group (21); the latter received a diet of bread, milk and oats supplemented over a 90-day period with 10 mg of Cu/day in the form of copper sulfate. In controls, the total Cu conc. of the liver was 4.7 ± 0.25 μg Cu/g fresh tissue; it was distributed among the cellular fractions as follows: mitochondria, 0.15 ± 0.013; nuclei; 0.26 ± 0.04; microsomes, 0.17 ± 0.024; and hyaloplasm, 0.43 ± 0.036 μg/mg of N. Under identical conditions of treatment, the experimental animals fell into 2 subgroups. In Subgroup 1, there was an approx. 14-fold increase in Cu content in the liver (70.1 ± 8.7 μg Cu/g fresh tissue). The bulk of the Cu was deposited in the mitochondria (3.5 ± 0.46 μg/mg N); in other cellular fractions it was as follows: nuclei, 1.2 ± 0.27; microsomes, 0.49 ± 0.10 and hyaloplasm, 1.5 ± 0.19 μg/mg N. In Subgroup 2, there was a 100-fold increase in liver Cu content (572.6 ± 50.5 μg/g fresh tissue); most was deposited in the nuclei (69.4 ± 19.9 μg/mg N), while other cellular fractions were as follows: mitochondria, 20.8 ± 1.9; microsomes, 4.8 ± 0.43 and hyaloplasm, 13.9 ± 1.8 μg/mg N. In Subgroup 2, there was a statistically significant increase in the RNA/DNA ratio (2.65 compared to 2.22 in Subgroup 1). These findings indicate 2 different mechanisms of Cu metabolism in the liver.

5800 QUANTITATIVE MICROANALYSIS OF BILE.

(E.) Nakayama, F. (Kyushu U. Fac. Me Fukuoka, Japan). *J. Lab. Clin. Med.* 69(4):594-609, 1967.

A quantitative microanalytical procedure for bi was developed which is based on the solvent par tition of bile constituents into subgroups followed by silicic acid column chromatography, ga chromatography and thin-layer chromatography. This method can be performed with less than 1 m of bile and can readily be scaled down to be applicable for experimentation on smaller anima It gives information on a wide variety of const uents present in bile, including total phospholipids; lecithin; and its fatty acid compositio cholic, chenodeoxycholic, deoxycholic and litho cholic acids; free fatty acids; cholesterol; mono-, di- and triglycerides; bilirubin; total solid; and total lipids. The quantitative anal sis of human gallbladder bile is presented.

5801 THE REGULATION OF INSULIN SECRETION: EFFECTS OF THE INFUSION OF GLUCOSE, RIBOSE, AND OTHER SUGARS INTO THE PORTAL VEINS OF DOGS. (E.)

Goetz, F. C. (U. Minnesota Sch. Med., Minneapolis), J. W. Maney and B. Z. Greenberg. *J. Lab. Clin. Med.* 69(4):537-557, 1967.

Small amounts of the following monosaccharides were infused into the portal veins of anestheti dogs in acute experiments: D-ribose, D-galacto D-fructose, D-glucose and D-2-deoxyglucose; thi was done to study the possibility of existence a regulator of insulin secretion outside of the pancreas itself. Insulin was measured by immun assay in pancreatic venous blood, and the parti min. output of insulin was noted. Ribose, glucose and galactose caused increases in the secretion rate of insulin, in the absence of a rise in arterial glucose conc. A questionable rise in insulin output was noted during and aft infusion of D-2-deoxyglucose, again without a rise in arterial glucose conc. These results and those of others support the existence of a carbohydrate-sensitive regulator of insulin sec tion outside of the pancreas; they do not indicate its location with certainty, but it is suggested that the liver is a possible site of such a receptor.

5802 EFFECTS OF PORTACAVAL SHUNTS ON FLOW AND COMPOSITION OF BILE. (E.)

Neistadt, A. (U. Rochester Sch. Med. & Dent., N. Y.), J. F. C. Lima and S. I. Schwartz. *Surge* 61(3):427-431, 1967.

After side-to-side and end-to-side portacaval shunts in dogs, no alterations were observed in the hourly bile flow under basal conditions. Bile composition was not altered by the acute shunting procedure; however, bile was conc. in dogs with chronic shunts. The hepatic arterial flow increased temporarily after the shunt, but decreased to below preshunt values in animals studied at 3 wk. The liver with a chronic shunt showed less response to a hydrocholeretic when compared with that of the control. No significant difference in choleretic response, bile flow and hepatic arterial flow was observed when side-to-side and end-to-side shunts were compared.

5803 RELEASE OF ENZYMES FROM THE LIVER. (E.) Schmidt, E. (Med. Clin., Hanover, Germany) and F. W. Schmidt. Nature (London) 213(5081):1125-1126, 1967.

The release of cellular enzymes (17) in isolated perfused rat liver was studied. The cell-free perfusion medium (a physiological saline soln. containing 25 g bovine albumin, 5.2 mmoles glucose, 1.3 mmoles lactate and 0.1 mmoles pyruvate/liter^2) was saturated with O_2; pH was adjusted to 7.30 and shifted during perfusion to 7.14. The perfusion medium temperature immediately before its entrance into the portal vein was 37°C; flow rate was 1-3 ml/g-liver/min. Omission of RBC from the perfusate caused a definite hypoxic lesion of liver cells with a decreased consumption of O_2. Av. loss of soluble protein from the liver was 30%. Within 4 hr. of perfusion, there was a remarkable increase in enzyme activity in the circulating medium. The enzyme pattern was split into 3 groups, the activities of which differed from each other by approx. an order of magnitude. Rates of release of most enzymes followed their resp. conc. gradients between liver and circulation system (enzymes with high activities in the liver cell reached high conc. in the extracellular space, while those with low activities in the cell did not reach high conc.). Rate of release was also inversely proportional to their resp. molecular wt.: the higher the molecular wt., the lower the percentage of intracellular activity found in the perfusion medium. Three enzymes did not follow this rule: glutamate dehydrogenase, glutamic-oxalacetic transaminase and malic dehydrogenase. This indicated that the intracellular distribution delayed release from the cells; glutamate dehydrogenase is solely in the rat liver cell mitochondria, which also contains more than 70% of the glutamic-oxalacetic transaminase and 40% of the malic dehydrogenase. The other enzymes studied originate from the cellular cytoplasm. Most of the activities of malic dehydrogenase and glutamic-oxalacetic transaminase found in the perfusion medium were derived from their cytoplasmic isoenzymes, which behaved like the other cytoplasmic enzymes, depending on their conc. gradient and their molecular wt. However, conc. of the mitochondrial isoenzymes, and the glutamate dehydrogenase, did not exhibit this correlation.

5804 EFFECTS OF THE ADMINISTRATION OF SOMATOTROPIC HORMONE ON HEPATIC AND SERUM PROTEINS. (It.) Cascone, O. (U. Catania, Italy) and F. Marletta. Boll. Soc. Ital. Biol. Sper. 42(14):911-914, 1966.

Serum and hepatic protein levels were determined in 21 rats (11 male and 10 female; age 2 mo.) following the i.m. admin. of somatotropic hormone (2 Evans U/day) for 24 (Group 1), 28 (Group 2), or 33 (Group 3) days. Wt. gain was negligible in rats treated for short periods and moderate (+16% compared to controls) in those treated for longer periods. The liver/somatic wt. ratio was decreased only in animals of Group 1. Hepatic nonprotein nitrogen levels increased in animals of Group 1, but were unchanged in those of Groups 2 and 3. Hepatic total protein levels were decreased only in animals of Group 1. Hepatic protein determination revealed an increase in albumin and the slow-migrating globulins but a decrease in the intermediate globulins (α_2-β). It is concluded that somatotropic hormone in the early stages of treatment does not cause a noticeable anabolic effect in the liver, whereas prolonged treatment causes an anabolic effect in the liver parallel to the increase in body wt.

5805 THE RELATIONSHIP BETWEEN LIVER AND PINEAL BODY. MORPHOLOGICAL AND HISTOENZYMATIC STUDIES IN THE EPIPHYSECTOMIZED RAT. (It.) Barbanti Silva, C. (U. Modena, Italy), G. P. Trentini and G. Barbolini. Arch. De Vecchi Anat. Pat. 46(1):65-97, 1965.

Morphological, histological and enzyme studies were conducted in the livers of 30 female Wistar rats (140-160 g) 70 days after incision of the superior longitudinal sinus alone (15 controls; Group 1) or after epiphysectomy according to the Thieblot-Le Bars technic (15 rats; Group 2). In animals of Group 2, morphological changes in the liver consisted of loss of laminar structure; reduced basophilia of the cytoplasm, cloudy and vacuolar degeneration, and beginnings of fatty degeneration of hepatocytes; irregular form and vol. of the Kupffer cells; thickening and irregular appearance of the reticular network (Mallory stain); increase in the number of collagenous fibers (Gomori stain) in the portal spaces and distribution around the hepatic vein. The hemosiderin content of the Kupffer cells (as determined by the Perls Prussian blue test) in rats of Group 2 was very low, i.e. similar to that observed in animals of Group 1. The activity of the following enzymes in the Kupffer cells of rats of Group 2 were either unchanged or decreased with respect to that of Group 1: alkaline and acid phosphatase (Burstone method); succinic dehydrogenase, TPN-diaphorase, DPN-diaphorase, glucose-6-phosphate dehydrogenase, and glutamic dehydrogenase (Balogh-Cohen method). It is concluded that epiphysectomy causes neither evident siderosis in the Kupffer cells of the liver (contrary to the intense siderosis observed in the histiocytes and follicles of the spleen following epiphysectomy in previous studies by the authors) nor increase in enzyme activity.

5806 THE INFLUENCE OF CONJUGATION OF CHOLIC ACID ON ITS UPTAKE AND SECRETION:

HEPATIC EXTRACTION OF TAUROCHOLATE AND CHOLATE IN THE DOG. (E.) O'Máille, E. R. L. (U. Liverpool, England), T. G. Richards and A. H. Short. J. Physiol. (London) 189(2):337-350, 1967.

Sodium taurocholate or cholate was systemically admin. at constant rate of approx. 2.9 μmole/min./kg body wt. to anesthetized dogs in which the common bile duct had been cannulated. Blood was sampled from systemic and hepatic veins under steady-state conditions, and the fraction of bile salt removed in a single passage through the liver was determined. Total hepatic blood flow was estimated by use of the Fick principle. The hepatic extraction fraction for synthetic taurocholate in 10 experiments was 92% ± 5% over the blood flow range encountered (1.1-2.8 ml/min./g-liver). Extraction of cholate extensively conjugated in the liver before excretion into bile was 79% ± 8%. Under circumstances of similar hepatic blood flow, extraction of cholate transferred to bile in the free form (after acute taurine depletion) was significantly less than that of either synthetic taurocholate or cholate which could be actively conjugated before excretion. These findings support previous studies on the advantage of conjugation in the transfer of cholic acid from blood to bile. The hepatic clearance of bile salt decreases with an increasing rate of admin., but the values obtained may be influenced by changes in hepatic blood flow. An increase in total hepatic flow was observed when the admin. rate of taurocholate exceeded approx. 5 μmole/min./kg body wt. The secretory max. for glycocholate, a bile salt not normally found in canine bile, was of the same order as that for taurocholate.

5807 POOL SIZE AND TURNOVER OF BILE ACIDS IN SIX HYPERCHOLESTEREMIC PATIENTS WITH AND WITHOUT ADMINISTRATION OF NICOTINIC ACID. (E.) Wollenweber, J. (Mayo Clin., Rochester, Minn.), B. A. Kottke and C. A. Owen, Jr. J. Lab. Clin. Med. 69(4):584-593, 1967.

Turnover, biological half-life and pool size of chenodeoxycholic and cholic acids were simultaneously determined in 6 hypercholesteremic patients by the admin. of ^{14}C-labeled cholic acid and tritium-labeled chenodeoxycholic acid, and by following the rate of disappearance of radioactivity from the bile. In 9 of 10 determinations the half-life of chenodeoxycholic acid was somewhat longer and its turnover was smaller than that for cholic acid. The hypocholesteremic effect of nicotinic acid in the 6 patients was accompanied by alterations of bile acid metabolism, but they did not follow any consistent pattern. In spite of considerable variations in some parameters of cholic and chenodeoxycholic acid metabolism, the combined turnover of both bile acids was not altered significantly by admin. of nicotinic acid.

5808 ANTIGENIC PROPERTIES OF LIVER CELL NUCLEI OF RATS OF DIFFERENT AGES. (Uk.) Zaichenko, A. P. (Acad. Med. Sci., Kiev, USSR). Fiziol. Zh. (Kiev) 13(2):262-266, 1967.

5809 CONVERSION OF CORTISONE TO CORTISOL AND PREDNISONE TO PREDNISOLONE. (E.) Jenkins, J. S. (St. George's Hosp., London) and P. A. Sampson. Brit. Med. J. 2(5546):205-207, 1967.

5810 PRELIMINARY METHODOLOGY FOR THE EXPERIMENTAL STUDY OF REGENERATIVE HYPERPLASIA OF THE LIVER AFTER PARTIAL HEPATECT (Fr.) Chambon, Y. (Fac. Med., Rennes, France) and F. Picard. Rev. Int. Hepat. 17(1):1-13, 19

5811 HEMOSIDERIN IN SPLEEN AND RES OF LIVE OF DIFFERENT VERTEBRATES. REPORT I. COMPARATIVE STUDIES IN FISH, AMPHIBIA AND REPTI (Ger.) Schubarth, H. (Pathol. Inst., Berlin). Jahr. Morph. Mikro. Anat. 75(4):429-437, 1966.

5812 HEMOSIDERIN IN SPLEEN AND RES OF LIVE OF DIFFERENT VERTEBRATES. REPORT II. COMPARATIVE STUDIES IN BIRDS AND MAMMALS. (Ger Schubarth, H. (Pathol. Inst., Berlin). Jahr. Morph. Mikro. Anat. 75(4):438-450, 1966.

5813 ELECTROKINETIC PROPERTIES OF NUCLEAR SURFACES. A COMPARISON OF NUCLEI FRO NORMAL AND REGENERATING RAT LIVER. (E.) Vassa P. S. (U. British Columbia, Vancouver, Canada), G. V. F. Seaman, W. L. Dunn and L. Kanke. Biochim. Biophys. Acta 135(2):218-224, 1967.

5814 PROTEIN SYNTHESIS BY MICROSOMAL PARTI CLES FROM REGENERATING RAT LIVER. (E Campbell, P. N. (Middlesex Hosp. Med. Sch., London), E. Lowe and G. Serck-Hanssen. Biochem J. 103(1):280-288, 1967.

5815 TURNOVER OF CHOLIC AND CHENODEOXYCHOL ACIDS IN NORMAL AND HYPOPHYSECTOMIZED RATS. (E.) Beher, W. T. (Henry Ford Hosp., Detroit, Mich.), M. E. Beher and B. Rao. Life Sci. 6(8):863-866, 1967.

5816 1-NAPHTHYLACETIC AND 2-NAPHTHYLACETIC ACID DERIVATIVES: STUDIES ON THE REL TIONSHIP BETWEEN CHEMICAL STRUCTURE AND CHOLERE ACTIVITY. (E.) Marazzi-Uberti, E. (De Angeli Inst., Milan, Italy), C. Turba and C. Bianchi. Chim. Ther. 2(1):66-70, 1967.

5817 SYNTHESIS OF UREA LIVER HOMOGENATES. (It.) Cimino, F. (U. Naples, Italy),

. Venuta and F. Salvatore. Boll. Soc. Ital. iol. Sper. 42(24):2026-2030, 1966.

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819 CHANGES INDUCED IN HEPATIC METABOLISM OF THE RAT: EFFECT OF THYROXINE ON HE UTILIZATION OF GLUCOSE-U-^{14}C. (It.) anetti, A. (U. Pavia, Italy), G. Doneda and G. ampaglione. Arch. Sci. Med. (Torino) 122(5): 03-310, 1966.

820 THE RATE OF DNA REPLICATION AT THE MOLECULAR, CHROMOSOMAL, CELLULAR AND NTERCELLULAR LEVELS IN REGENERATING RAT LIVER. E.) Looney, W. B. (U. Virginia Sch. Med., harlottesville), L. O. Chang and F. W. Banghart. roc. Nat. Acad. Sci. U.S.A. 57(4):972-978, 1967.

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822 EFFECT OF OROTIC ACID UPON PYRIDINE COENZYMES CONTENT IN TISSUES OF RAT IVER. (Rus.) Shushevich, S. I. (Biochem. nst., Kiev, USSR), A. G. Khalmuradov and V. M. hestopalova. Vop. Med. Khim. 13(2):136-139, 1967.

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5824 THE EFFECT OF NICOTINIC ACID ON GLYCOLYTIC CARBOHYDRATE BREAKDOWN IN THE LIVER. (E.) Ammon, H. P. T. (U. Erlangen-Nürnberg, Germany) and C. J. Estler. Life Sci. 6(6):641-647, 1967.

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5827 EFFECT OF THYROID FUNCTION AND GLUCOSE DIET ON THE CONTENT OF ENERGY RELEASING METABOLIC ENZYMES OF THE RAT LIVER. (Ger.) Mitzkat, H. J. (Oststadt Hosp., Hanover, Germany), G. Rassner and D. Pette. Verh. Deutsch. Ges. Inn. Med. 72:450-453, 1967.

5828 LIPID SYNTHESIS, INTRACELLULAR TRANSPORT, STORAGE, AND SECRETION. I. ELECTRON MICROSCOPIC RADIOAUTOGRAPHIC STUDY OF LIVER AFTER INJECTION OF TRITIATED PALMITATE OR GLYCEROL IN FASTED AND ETHANOL-TREATED RATS. (E.) Stein, O. (Hadassah U. Hosp., Jerusalem) and Y. Stein. J. Cell Biol. 33(2):319-339, 1967.

5829 POST-NATAL CHANGES IN LIVER AND BRAIN LIPIDS OF RATS. (E.) Vyas, M. K. (T. N. Med. Coll., Bombay) and K. G. Tankasale. Curr. Sci. (Bangalore) 36(3):73-74, 1967.

5830 EFFECTS OF PUROMYCIN AND ACTINOMYCIN D ON THE INCREASE OF CYSTATHIONASE AND CYSTEINE SULPHINIC ACID DECARBOXYLASE ACTIVITIES IN THE LIVER OF THYROIDECTOMIZED RAT. (E.) Chatagner, F. (Biol. Chem. Lab., Paris), O. Durieu-Trautmann and M. C. Rain. Nature (London) 214(5083):88-90, 1967.

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5833 ENZYMES OF PLASMA MEMBRANES OF LIVER. (E.) Lansing, A. I. (U. Pittsburgh Sch. Med., Pa.), M. L. Belkhode, W. E. Lynch and I. Lieberman. J. Biol. Chem. 242(8):1772-1775, 1967.

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5836 HYDROCORTISONE INDUCED CHANGES IN SUGAR NUCLEOTIDE CONTENT OF SPONGE BIOPSY CONNECTIVE TISSUE IN THE ABSENCE OF COMPARABLE CHANGES IN THE LIVER. (E.) Bole, G. G., Jr. (U. Michigan Med. Sch., Ann Arbor) and J. C. Leutz. J. Lab. Clin. Med. 69(4):610-623, 1967.

5837 CHRONIC CATHETERIZATION OF THE PORTAL VEIN IN BABOONS. (E.) Crossley, J. N. (Guy's Hosp. Med. Sch., London) and I. McColl. J. Physiol. (London) 189(2):51P, 1967.

5838 THE INFLUENCE OF AMINO ACIDS ON COPPER UPTAKE BY RAT LIVER SLICES. (E.) Harris, D. I. M. (U. Toronto, Canada) and A. Sass-Kortsak. J. Clin. Invest. 46(4):659-667, 1

5839 INCORPORATION IN VIVO OF ACETATE-1-^{14}C INTO LIVER AND SERUM LIPIDS IN HEMORRHAGIC LIPEMIA IN THE RAT. (E.) Hirvisalo, E. (Wihuri Res. Inst., Helsinki, Finland) and A. Louhija. Acta Physiol. Scand. 69(1-2):79-86, 19

5840 CHANGES IN LIVER GLYCOGEN DURING RESTORATION OF NUTRITION IN RATS. (Sp Ortiz, B. P. (Child. Hosp., Mexico City) and E. Rico. Bol. Med. Hosp. Infant. Mexico 24(1):67-7 1967.

41 INFANTILE GASTROENTERITIS. STUDIES OF
A POSSIBLE VIRAL ETIOLOGY. (Fr.)
ylet, R. (Fac. Med., Dakar, Senegal), S. Dauchy
d A. B. Maffre. Bull. Soc. Path. Exot. 59(2):
3-187, 1966.

teroviruses were isolated from 59 of 387
ildren under 4 (15.2%) with epidemic diarrhea;
e incidence in 1961, 1963 and 1964 was 28%,
% and 9.6%, resp. In 375 control children, the
cidence in the same periods was 18%, 12.96%
d 6.5%, resp. (total 14%). In the children
th diarrhea, virus types included ECHO in
2%, polio in 3.6% and Coxsackie in 3.6%. ECHO
ruses were encountered more frequently in the
ntrol group (8.15%); the other 2 virus types
re not consistently or significantly more
equent in the children with gastroenteritis.
her virus types (adeno, herpes, influenza,
patitis) also appeared to be non-significant.
is concluded that enteroviruses play a
gligible part in the etiology of diarrhea in
negalese children.

42 ROUTINE RECTAL SWAB CULTURE. AN
EPIDEMIOLOGICAL SURVEY IN THE ELDERLY.
.) Mechie, A. M. (Foresthall Hosp., Glasgow,
otland) and J. G. Pritchard. Practitioner
8(1185):396-401, 1967.

a survey of 1,529 patients over 60 yr. old on
om culture of rectal swabs was done at
spital admission, there was a 3.9% incidence
intestinal infection, chiefly Shigella and
cherichia. Such individuals may be a potential
urce of infection to young children in a 3-
4-generation household. It is thought that
infection rate among geriatric admissions of
in 25 cases justifies the laboratory time
pended on routine rectal swab culture.

343 PRINCIPLES OF GENERAL AND ANTIBIOTIC
TREATMENT OF GASTROENTERITIS CAUSED
E. coli. (Fr.) Gyergyai, K. (Istvan Apathy
ildren's Hosp., Budapest) and G. Páll. Ann.
aediat. 207(5):307-320, 1966.

f 1181 infants and children with E. coli
nteritis, 170 (14.4%) were asymptomatic
arriers, 477 (47.2%) had slight symptoms, 386
38.2%) had moderate symptoms, 122 (12.1%) had
evere disease and 26 (2.5%) had toxic disease;
05 of these patients (68.1%) were infants
age 0-9 mo.) and only 6.4% (51) were asymptomatic
arriers. Antibiotics (chloramphenicol deriva-
ives, tetracycline, neomycin, polymyxin B,
ycloserine, colimycin, kanamycin and combina-
ions of these agents) were admin. to 848
ymptomatic patients and 47 asymptomatic
arriers (75.8% of the group). The development
f resistance in the organism was shown by the
ncrease in the number of children who remained
symptomatic carriers (35% of 378 patients
treated in 1957-1960; 50.3% of 517 children treated in 1961-1963). However, only 6 children died (0.59%). Addition of blood transfusions and plasma γ-globulin to a bykomycin-polymyxin B regimen reduced the number of carriers in infants (24.2% of 66 children in 1957-1960, 27.8% of 97 children in 1961-1963). Tetracyclines, chloramphenicol derivatives and cycloserine D were usually unsatisfactory; neomycin and colimycin were effective at first, but after 2-3 yr. of use the bacteria became resistant.

5844 A MODIFIED BIOPSY NEEDLE. (E.)
Wichelman, D. F. (3022 E. 14th St., Oakland, Calif.). Arch. Surg. (Chicago) 94(3): 432, 1967.

A new modified biopsy needle is described which combines the best features of the Silverman needle and the Franklin modification of the latter. The Franklin modification, which uses 2 coapting silver solder plugs at the blade tips, is readily converted to the new needle by removal of one of the silver solder plugs. This new needle has been used for biopsy of the kidney, prostate and liver; tissue yield has been very high and the specimens have often been of exceptional quality. The technic of use of this needle is described.

5845 EXPERIMENTAL EVALUATION OF A CROSS-LINKED GELATIN ADHESIVE IN GASTROINTESTINAL SURGERY. (E.) Bonchek, L. I. (NIH, Bethesda, Md.) and N. S. Braunwald. Ann. Surg. 165(3):420-424, 1967.

Experiences with the development and experimental application of a new tissue adhesive system consisting of gelatin-resorcinol-formaldehyde are reviewed. Advantages over the most widely used surgical adhesive, Eastman 910, include the ability to establish a rapid bond in the presence of moisture without the application of pressure, prolonged shelf life and high initial viscosity. The histotoxicity of the original adhesive system has been significantly reduced. Experimental evaluation of the adhesive for intestinal surgery was performed on 20 dogs. Transverse incisions in the distal ileum failed to heal in 7 of 8 control animals, but complete healing occurred in 10 of 12 animals in which the adhesive system was used to seal the incisions. Similar adhesive systems, in which glutaraldehyde or a glutaraldehyde-formaldehyde mixture was substituted for formaldehyde, also were evaluated. Both modified systems effectively controlled hemorrhage from the spleen in 12 dogs, but the glutaraldehyde-formaldehyde mixture seemed to maintain its bond strength in vivo more satisfactorily.

5846 A NEW NONOPERATIVE TECHNIC FOR THE
DIAGNOSIS OF PENETRATING INJURIES TO

THE ABDOMEN. (E.) Cornell, W. P. (926 E. McDowell Rd., Phoenix, Ariz.), P. A. Ebert, L. J. Greenfield and G. D. Zuidema. *J. Trauma* 7(2): 307-314, 1967.

Over a 2-yr.-period, penetrating abdominal wounds in 112 patients were evaluated by inj. sodium diatrizoate into the wound (60-80 ml) by way of a catheter in order to determine whether penetration of the peritoneum had occurred. Following inj. of contrast media abdominal roentgenograms were obtained in both recumbent and lateral positions. It is important to maintain high enough inj. pressure to permit the contrast media to follow the tract of injury. Of the 36 patients showing radiographic evidence of contrast media in the peritoneal cavity (6 with clinical signs of internal injury), all 36 showed peritoneal penetration at later surgery. None of the 20 patients (20 of 74 patients total) who originally showed no evidence of contrast media in the peritoneal cavity, demonstrated peritoneal penetration at subsequent surgery. Over a 16-mo.-period, none of the 54 patients from this same group demonstrated any clinical symptoms of intra-abdominal injury. Two of the 8 patients (including 1 repeat) with radiologically uninterpretable results showed no peritoneal penetration at laparotomy. No evidence of tissue necrosis or infection was associated with use of sodium diatrizoate which was quickly absorbed from the soft tissue. No prolonged pain or discomfit was experienced by patients in this series, although local and mild pain were noted during actual inj.

5847 RADIOGRAPHIC STUDIES OF THE GASTROINTESTINAL TRACT OF THE FETUS *IN UTERO*. (E.) Idriss, F. S. (Children's Mem. Hosp., Chicago, Ill.) and H. Nikaidoh. *J. Pediat. Surg.* 2(1):29-34, 1967.

Radiopaque material was instilled directly into the stomach by means of a silastic mesogastric tube following surgical exposure of the fetus in 50 pregnant dogs. Loss of amniotic fluid and disturbance of fetal-maternal relationships were minimized by employment of a latex well sutured to the wall of the uterus through which surgery was conducted. The well retained any amniotic fluid as well permitting studies to be carried out during early pregnancy. Roentgenograms were obtained at 15 and 45 min. after inj. of dye, hourly during the next day and daily until whelping occurred. Initial difficulties included difficulty in determining length of gestation in mongrel dogs, pulling out of the gastric tube, and the delicate condition of fetus at 3 wk. prior to whelping. Of the 22 successful gastrointestinal visualizations, there were 14 live births and 8 instances of *in utero* death, whereas there were 6 live births and 22 *in utero* deaths in the 28 cases of poor visualization. Filling of the small intestine was achieved in 30-60 min. while filling of the large intestine occurred in 3-4 hr. where the media stayed until birth. Fetal death and failure usually ensued when dye transit time was observed to be nil o too rapid.

5848 CINERADIOGRAPHIC EXAMINATION OF THE UPPER GASTROINTESTINAL TRACT IN OBSTRUCTIVE JAUNDICE. (E.) Adler, D. C. (201 Wilshire Blvd., Los Angeles, Calif.) and H. I. Meyers. *J.A.M.A.* 199(10):709-713, 1967.

Many clinicians consider the diagnostic accura of an upper gastrointestinal tract examination which is usually performed on patients with obstructive jaundice, to be quite low. A prospective study was undertaken to determine the diagnostic accuracy of the gastrointestina examination could be improved with the use of cineradiography; 61 patients thought to have obstructive jaundice were studied with the latter procedure. The diagnoses obtained were compared with pathological and clinical findin The diagnosis of periduodenal carcinoma was correctly made or excluded for 50 patients, giving an 82% accuracy level. These findings suggest that cineradiography provides a convenient method of complete recording of duoden changes that may be analyzed at length and in detail, and which can result in a higher degre of accuracy in the diagnosis of periduodenal carcinoma than is obtainable with conventional methods.

5849 SERUM AMYLASE AND LIPASE. NEWER PERSPECTIVES. (E.) Berk, J. E. (1721 Griffin Ave., Los Angeles, Calif.). *J.A.* 199(2):98-102, 1967.

A review is presented of recent advances in th methodology of serum amylase and serum lipase that enhance the clinical usefulness of these tests. A reliable micro-saccharogenic technic has been devised that allows measurement of amylase activity with small amounts of serum (as little as 0.01 ml). Amylase derived from the parotid gland can now be differentiated in serum from that originating in the pancreas; this suggests that other isoenzymes of amylase may soon be distinguished. Serum lipase can n be reliably assessed in small quantities of serum (0.05 mg) through the use of a newly-described micromethod. Abbreviations of the period of incubation required and improvements in technic now permit measurements of the activity of serum lipase to be made with greate sensitivity and rapidity.

5850 FREQUENCY OF ISOLATION OF ENTEROPATHO GENIC *Shigella salmonella* AND *E. coli* FROM FECES OF PATIENTS WITH ACUTE DIARRHEA IN THE CITY OF SÃO PAULO. (Por.) Serrano, J. A. (Enterobact. Lab., Sao Paulo, Brazil) and L. R. Trabulsi. *Arq. Gastroent.* (*Sao Paulo*) 3(4): 221-225, 1966.

1 USE OF GRANULATED MEXAFORME IN INFANTILE DIARRHEA. (Fr.) Salanova, (Child. Med. Clin., Toulouse, France). Rev. . Toulouse 3(3):275-280, 1967.

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3 CLINICAL TRIAL OF A NONPROTEIN NUTRIENT IN THE TREATMENT OF RENAL INSUFFICIENCY CHRONIC NONINFECTIOUS ENTEROPATHY. (It.) ti, R. (U. Genoa, Italy) and G. Vignola. z. Sanit. (Milano) 37(7-8):364-368, 1966.

4 THE ANTIGENIC INTERRELATIONSHIPS OF LIVE CHOLERA VACCINES AND A METHOD OF ASSAY. (E.) Dutta, N. K. (Haffkine Inst., bay), A. N. Dohadwalla and M. C. Chakrabarti. Path. Bact. 92(2):337-343, 1966.

5 CHANGES IN METABOLISM OF VITAMINS B$_6$, B$_{12}$, PP, PANTOTHENIC ACID AND VITAMIN IN PATIENTS WITH CHRONIC COLITIS OF VARIOUS IOLOGY TREATED WITH TETRACYCLINE. (Rus.) emener, S. M. (Inst. Vitaminol. Res., Moscow), A. Alferova, G. N. Zgurskaia, E. I. Zubkova, S. Pinko and K. P. Rogova. Antibiotiki (4):343-347, 1967.

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57 EFFECT OF DRUGS IN DISTURBANCES OF CARBOHYDRATE DIGESTION. (Ger.) hütz, E. (U. Clin. Erlangen, Germany). Med. lt 18(15):968-972, 1967.

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59 COMPARATIVE VALUE OF VARIOUS DIAGNOSTIC METHODS IN INTESTINAL AMEBIASIS. (Fr.) resco, A. (Cantacuzino Inst., Bucharest), G. pașco and R. Silard. Arch. Roum. Path. p. Microbiol. 25(4):859-866, 1966.

360 THE SEROLOGIC RESPONSE OF PATIENTS WITH AMEBIASIS COMPARED BY GEL-IFFUSION, HEMAGGLUTINATION, AND PHAGOCYTOSIS ECHNIQUES WITH A COMMON Entamoeba histolytica NTIGEN PREPARATION. (E.) Halpern, B. (Northwestern U. Med. Sch., Chicago, Ill.), J. J. Young, J. Dolkart, P. D. Armour III and R. E. Dolkart. J. Lab. Clin. Med. 69(3): 467-471, 1967.

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5865 SCHISTOSOMICIDAL ACTIVITY OF LUCANTHONE HYDROCHLORIDE, HYCANTHONE AND THEIR METABOLITES IN MICE AND HAMSTERS. (E.) Berberian, D. A. (Sterling-Winthrop Res. Inst., Rensselaer, N. Y.), H. Freele, D. Rosi, E. W. Dennis and S. Archer. J. Parasit. 53(2): 306-311, 1967.

5866 TREATMENT OF SCHISTOSOMIASIS MANSONI BY THE ASSOCIATION OF AMBILHAR BARBITURATE. PRELIMINARY REPORT ON TOLERANCE. (Por.) Zacharias, N., P. R. Carvalho and J. F. Penteado. Hospital (Rio) 71(3):656-662, 1967.

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TABLETS. (Por.) Campos, R. (U. Sao Paulo, Brazil), V. Amato Neto, A. T. M. Vasconcellos and R. A. S. Wanderley. Hospital (Rio) 71(3): 703-709, 1967.

5869 FALSE INTRA-ABDOMINAL TUMORAL IMAGES WITH ANGIOGRAPHY. (E.) Chavez, C. M. (U. Mississippi Med. Ctr., Jackson), L. O. Mora, W. R. Fain and J. H. Conn. Angiology 18(4): 248-255, 1967.

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5871 5-FLUOROURACIL INHIBITION OF EXPERIMENTAL PERITONEAL ADHESIONS. (E.) Goldman, L. I. (Temple U. Med. Ctr., Philadelphia, Pa.) and G. P. Rosemond. Amer. J. Surg. 113(4): 491-493, 1967.

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5873 DIAGNOSTIC ERRORS IN BILIARY PERITONITIS. (Rus.) Maliugina, T. A. (Sklifosov Inst. Emergency Treatment, Moscow). Sovet. Med. 30(2):106-111, 1967.

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5876 A NEW TYPE OF BOWEL FORCEPS. Gallit A. Amer. J. Surg. 113(3):447-448,

5877 NEW INSTRUMENTS FOR GENERAL SURGERY, ESPECIALLY FOR GASTRECTOMY. (Por.) Pinotti, H. W. (U. Sao Paulo, Brazil.). Rev. Ass. Med. Brasil. 12(2):75-77, 1966.

5878 A TECHNIC OF ABDOMINAL SUTURE. (E.) Fratkin, L. B. (U. British Columbia, Vancouver, Canada). Amer. Surg. 33(3):207-208 1967.

5879 HYPOSTHENIC EFFECTS OF A SYNTHETIC DRUG ON THE INTESTINAL WALL. (It.) Gaglio, M. (U. Catania, Italy), O. Cascone and F. Marletta. Arch. Ital. Mal. Appar. Dig. 33(2):199-202, 1966.

5880 5-FLUOROURACIL (5-FU) IN THE TREATMENT OF ADENOCARCINOMAS OF THE DIGESTIVE TRACT. (Por.) Vinhaes, J. C. (Sta. Casa da Misericordia Hosp., Guanabara, Brazil) and A. J. N. Ferreira. Hospital (Rio) 71(2): 453-474, 1967.

5881 HETACILLIN IN THE TREATMENT OF TYPHO FEVER. (E.) Scioli, C. (U. Naples, Italy) and G. Giusti. Clin. Med. 74(4):68-70, 1967.

See also abstract nos.: 5774,5800,6109,6116,6346,6600

32 PYURIA IN ACUTE INFANTILE DIARRHEA.

(E.) Gonzáles Alvarez, O. (San Juan
:y Hosp., Puerto Rico). Bol. Asoc. Med. P.
:o 58(11):533-538, 1966.

nples of urine from 385 patients with acute arrhea were studied; all were infants below 1 . of age and 71% were less than 4 mo. old. e incidence of pyuria was sharply reduced by llection of clean voided urine samples in astic bags, as compared with those routinely tained. Bacterial colony counts were performed on all of the clean voided samples (288) order to establish a correlation between such unts and the diagnosis of urinary tract fection; there was no satisfactory correlation d the data suggested a high degree of contamination by this method. Results indicate at by adequate cleansing the incidence of uria decreases, and they also corroborate the nding that below 1 yr. of age there is no sex fference in this finding. Use of neomycin did t influence the presence of pyuria, and there s no association between specific enteritis th Escherichia coli and an increased incidence urinary infection. Based on these findings, a udy has begun comparing clean voided samples urine with catheterized samples in order to rther investigate the most reliable method to recommended in establishing the diagnosis of inary tract infection in infants less than 1 . old suffering from acute diarrhea.

83 EXCRETION AND DETERMINATION OF THE PRESENCE OF POLYVINYLPYRROLIDONE IN
UDATIVE GASTROENTEROPATHIES. (EXPERIMENTAL
UDY). (It.) Lippi, U. (P. Cosma Civil Hosp.,
dua, Italy), E. Pulido and P. Trevisan.
oliclinico [Med.] 73(5):299-303, 1966.

10 male rabbits (1.5-2 kg) inj. i.v. with nonabeled polyvinylpyrrolidone (1 g/10 ml of aline), the excretion of the agent was studied nd its presence in the feces determined by ark-field illumination. In 5 rabbits (Group 1), nly the agent was admin. and animals were left ntact; in the other 5 (Group 2), animals were ubjected to digital compression of the proximal oops of the small intestine before the admin. f the agent. Animals of Group 1 showed no uminous bodies indicating the presence of polyinylpyrrolidone in either the intestinal wall r feces. On the other hand, the feces of nimals of Group 2 showed numerous luminous odies of polyvinylpyrrolidone. Microscopic tudies revealed damage to the intestinal wall ith both edema and hemorrhage of the subserous nd submucosal layers. Luminous bodies were lso observed in the interstitium between the lands, in the submucosal layer, in the intesinal lumen, and in the subserosal layer where lasma exudation was most apparent. Results onfirm the value of the Gordon test in xudative gastroenteropathies.

5884 THE SO-CALLED "PARACOLON" BACTERIA. A BACTERIOLOGIC AND CLINICAL REAPPRAISAL.

(E.) Fields, B. N. (U.S. Public
Health Serv., Atlanta, Ga.), M. M. Uwaydah,
L. J. Kunz and M. N. Swartz. Amer. J. Med.
42(1):89-106, 1967.

Evaluation of less well known Enterobacteriaceae including Serratia, Citrobacter, Providence, Hafnia, Edwardsiella and Arizona was completed with special emphasis on their clinical importance in bacteremia and infections of the urinary and respiratory tracts. These paracolon organisms represented 8% of all isolates of Enterobacteriaceae from blood and urine specimens and 23% of the sputum isolates. The number of patients with paracolons isolated from blood, urine and sputum specimens were, resp., 6, 43 and 22 patients for Serratia; 2, 74, and 55 patients for Citrobacter; 0, 35 and 2 patients for Providence. Hafnia strain was detected in urine (1) and sputum (2) specimens, while 3 patients with bacteremia attributable to Serratia were studied (primary site being the urinary tract in 2 patients and infected surgical wound in the third). Most of the isolates of Serratia, Citrobacter, Providence and Hafnia were etiologically significant in patients with urinary tract infections. Infections with the Providence strain showed a high incidence among young males. Most patients had a history of urologic procedure, asymptomatic pyuria, and prolonged antibiotic therapy. Underlying urologic disorders were especially predisposing to future infection in the Providence group. Paracolon isolation was frequently associated with chronic pulmonary disease (59 with pulmonary infection) with Citrobacter the only organism isolated at the onset of bronchopneumonia. Serratia and Citrobacter were associated with significant superinfection 30% and 9% of the time, resp. Negative correlation between existent pulmonary infection and paracolon isolation was observed in 22 patients studied. A case of significant superinfection in a 72-yr.-old woman caused by Serratia is described. Citrobacter strains were the most sensitive to antibiotic admin. (especially kanamycin and colistin). Bacteriology, clinical aspects, epidemiology, and antibiotic sensitivity is presented for Serratia, Providence, Citrobacter, Hafnia, Edwardsiella and Arizona strains.

5885 ISOLATION OF VIRAL DIARRHEA-MUCOSAL DISEASE COMPLEX VIRUS IN ITALY. A PRELIMINARY REPORT.

(E.) Castrucci, G. (U.
Perugia, Italy), V. Cilli and G. Gagliardi.
Boll. Ist. Sieroter. Milan. 45(11-12):533-538,
1966.

The isolation and identification of 2 strains of virus diarrhea virus (VDV), TVM1 and TVM2 from material collected in cattle affected by the virus diarrhea-mucosal disease complex (VD-MD) is reported. The virus was isolated in bovine embryo kidney cultures and its identity with the causative agent of the VD-MD complex was made on the basis of the following properties: 1) full sensitivity to pH 3, trypsin and chloroform; partial resistance to ether; and stability to 2'-(α-hydroxybenzyl)-benzimidazole; 2) neutralization by VDV C60F immune serum; 3) experimental pathogenicity for bovine and cross-immunity with VDV C60F; and 4) particle size of 57-58 mμ diameter and identity with the RNA virus group. According to serologic typing, performed with the 2 isolates plus some VDV strains from the United States (VDV C60F, VDV NADL, VDV 65/150), TVM1 and TVM2 were antigenically identical; 4 serotypes could be distinguished among the viruses tested.

5886 STUDIES ON DIARRHOEAL DISEASES IN SEVEN COUNTRIES BY THE WHO DIARRHOEAL DISEASES ADVISORY TEAM. (E.) Van Zijl, W. J. (World Health Organ., Geneva, Switzerland). Bull. WHO 35(2):249-261, 1966.

Incidence of diarrhea and isolation rates of Shigellae in children (data collected over a 1-mo. period in children 10 yr. of age) are reported from a series of separate studies over a 5-yr. period in Mauritius, Sudan, United Arab Republic (UAR), Ceylon, Iran, East Pakistan and Venezuela. The mo. rate of diarrhea, in areas having a water supply, was highest in Venezuela (39% with Iran second at 36%), whereas Iran showed a rate of 48.7% in areas deprived of water supply (43% for Venezuela). Sudan and UAR showed a high rate of diarrhea incidence and rate of enteropathogen detection similar to that of Iran. The low rates of diarrhea for both Ceylon and Mauritius, in view of local habits, were probably underestimations. A high diarrhea rate was observed in East Pakistan (20%), which also reported a high rate of protozoan and helminth isolation. Helminth and protozoan infestation was highest in Venezuela. Shigellae represented the largest group of enteropathogenic bacteria that was isolated in this study. Because of the generally high rates of helminth and protozoan infestation (especially in children who resided in high infestation zones), it is likely that the role of parasites in the incidence of diarrhea has heretofore not been fully appreciated in the countries evaluated. A combined statistical evaluation of all countries showed that the availability of water significantly reduced the incidence of diarrhea and detection rate of Shigellae, but not enough to solve the problem completely. The importance of water availability along with complete sanitation for reduction of diarrhea was emphasized. Other important factors observed in this study were the fly index and the mode of disposing of excreta. The dangers of improper sanitary method were emphasized. Helminth and protozoan infestation in preschool children was reported (Trichuris trichiura was the most common parasite isolated) according to organism type and age of the child. The limitations of antibiotic and s drug admin. and the proven benefits of breast-feeding (when compared to other foods) are reported.

5887 THE EFFECTS OF X RADIATION ON PERITONEAL HEALING: AN EXPERIMENTAL STUDY. (E.) Venables, C. (Westminster Hosp., London, S.W. 1), H. Ellis and J. E. Burns. Brit. J. Radiol. 40(472):275-279, 1967.

Adult white Wistar rats (18) were divided into groups of 3 each; each animal was laparotomize and a 1-cm^2 area of peritoneum was exposed; 5 groups were irradiated with doses from 250 r-5,000 r. Control rats received no irradiation. There was no apparent effect of irradiation, even at max. dosage, on the animal or healing a defect upon the opposite side. In a further group of 34 rats, peritoneum was exposed on bot sides, that on the right serving as the control A single dose of 1,500 r lasting 3.5 min. was admin. to the area of peritoneum on the left side. This dose of X-irradiation produced mark inhibition of local fibroblast proliferation in peritoneal wounds, but had no effect on the reconstitution of the serosal mesothelium. It is suggested, based upon this latter finding, that the newly-formed mesothelium is principall derived from free-floating cells in the peritoneal exudate.

5888 PREVENTION OF PERITONEAL ADHESIONS BY SILICONE SOLUTION. (E.) Aboulafia, and W. Z. Polishuk (Hadassah Med. Sch., Jerusalem, Israel). Arch. Surg. (Chicago) 94(3):384-387, 1967.

The ability of dimethylpolysiloxane fluid ('silicone') of a viscosity grade of 20 centistokes (1 centistoke is the viscosity of water) to prevent peritoneal adhesions after mechanical injury to the intestine was studied 50 rabbits. The standard injury used was an abrasion of the small intestinal serosal surfac over an area of 15-20 cm by 3-5 cm. Silicone i different amounts was then introduced into the peritoneal cavity, and results were assessed 10-21 days after the operation. All animals (1 in the control group developed Grade 4 adhesion In the group in which 50 ml silicone was used (14), no adhesions were found in 10 animals and very slight adhesions in 4. These results sugg that the mechanical separation of injured intestinal areas is an effective method of prevention of adhesions. Long-term toxicity studies must be done before silicone can be use as a mechanical barrier in human patients.

5889 PATHOGENESIS OF PERITONITIS. I. THE EFFECT OF Escherichia coli AND HEMOGLOBIN ON PERITONEAL ABSORPTION. (E.) Filler, R. M. (Walter Reed Army Inst. Res., Washington, D. C.) and H. K. Sleeman. Surgery 61(3):385-39 1967.

sorption of bacteria and colloidal protein
om the peritoneal cavity of white rats was
duced when lethal peritonitis was induced by
e addition of hemoglobin to an otherwise
nlethal *Escherichia coli* i.p. inoculation.
creased peritoneal absorption was shown by
termining, at selected times after infection,
absorption of dye-tagged protein from the
ritoneal cavity into the blood, and 2) the
mber of bacteria contained in the peritoneal
vity. Lethality of the *E. coli*-hemoglobin
oculum was attributed to the decreased
earance of bacteria from the peritoneal cavity,
ich allowed their continued growth and pro-
ction of soluble, absorbable toxins.

90 PATHOGENESIS OF PERITONITIS. II. THE EFFECT OF *Escherichia coli* AND
JUVANT SUBSTANCES ON PERITONEAL ABSORPTION.
.) Sleeman, H. K. (Walter Reed Army Inst.
s., Washington, D. C.), J. W. Diggs, W. S.
ndry and R. M. Filler. *Surgery* 61(3):393-398,
67.

he effects of *Escherichia coli* and adjuvant
ubstances on the peritoneal absorption of
vans blue dye-tagged protein were studied in
hite rats. Only those combinations of *E. coli*
nd adjuvant substances that resulted in plasma
ye conc. of 10 mg/liter or less were signifi-
antly lethal; this group included *E. coli* plus
emoglobin (lysed RBC or commercial), myoglobin
nd hog gastric mucin. Plasma dye conc. from
0-15 mg/liter were associated with morbidity in
he rats, but not with mortality. Included in
his group were *E. coli* plus phosphatidyl
thanolamine, sodium deoxycholate, gum traga-
anth, and mixtures of hemin and globin. *E. coli*
lus hemin, globin or polystyrene microspheres
ad much less adverse effect on peritoneal
bsorption and produced no deaths. Depression
f peritoneal absorption, as shown by plasma
onc. of dye, correlated well with lethality.

891 MEASUREMENT OF GASTROINTESTINAL PROTEIN LOSS USING CERULOPLASMIN LABELED
ITH ^{67}COPPER. (E.) Waldmann, T. A. (NCI,
ethesda, Md.), A. G. Morell, R. D. Wochner, W.
trober and I. Sternlieb. *J. Clin. Invest.*
6(1):10-20, 1967.

Ceruloplasmin labeled with ^{67}Cu and admin. i.v.
o dogs, control human subjects and patients
ith excessive gastrointestinal loss, fulfilled
he requirements for a label for quantification
of gastrointestinal protein loss. The radio-
copper moiety was poorly absorbed from the
gastrointestinal tract, not actively secreted
into the intestinal tract and did not alter
significantly the metabolism of ceruloplasmin.
Approx. 70% of the body pool of ceruloplasmin in
both man and dog was within the intravascular
space. The mean ceruloplasmin conc. in control
human subjects was 30 mg/100 ml, with the total
circulating and total body ceruloplasmin pools being 15.5 and 22 mg/kg, resp. In patients with excessive gastrointestinal protein loss secondary to intestinal lymphangiectasia, the serum ceruloplasmin conc. was reduced to 16 mg/100 ml with a comparable reduction in the total circulating and total body ceruloplasmin pools to 8.8 and 12 mg/kg, resp. The survival half-time of ceruloplasmin was 6.1 days in normal human subjects; it was 4.5 days in normal dogs. From 1.0-1.9% of the intravascular pool of ceruloplasmin was lost into the gastrointestinal tract of the dog per day; this represented less than 11% of the overall metabolism of this protein. In control human subjects, from 1.9-3.9% of the intravascular pool was lost into the gastrointestinal tract each day; this represented a max. of from 11-22% of the overall metabolism of this molecule. Patients with intestinal lymphangiectasia, in contrast, had a markedly shortened ceruloplasmin survival of 3.1 days, with from 15-40% of the intravascular pool of ceruloplasmin cleared into the gastrointestinal tract daily; this represented 76% of the overall metabolism of this protein. It is concluded that although bulk loss of serum proteins into the gastrointestinal tract does not normally appear to be a significant factor in protein metabolism in normal man and dogs, such a loss is a major factor in the pathogenesis of the hypoceruloplasminemia noted in patients with intestinal lymphangiectasia.

5892 GASTROINTESTINAL OBSERVATIONS IN ROSACEA. (E.) Marks, R. (St. George's Hosp., London), R. J. Beard, M. L. Clark, M. Kwok and W. B. Robertson. *Lancet* 1(7493): 739-743, 1967.

Study of 62 patients with rosacea and 62 control patients with other skin disorders showed no difference in the prevalence of gastrointestinal disease or symptoms in the 2 groups. Rosacea patients were significantly heavier than controls. The diet in 33 rosacea patients and 33 control patients did not differ significantly. Gastric biopsies in 18 rosacea patients and 16 control skin patients showed no demonstrable differences, and jejunal biopsies from 34 rosacea patients and 34 patients with other skin diseases revealed no demonstrable abnormality. One reason for the belief that pathogenesis of rosacea is linked with gastrointestinal disorders may be that patients with rosacea flush more frequently and more easily when eating or drinking than do controls.

5893 VIRAL AGENTS IN GASTROINTESTINAL DISEASE. (E.)(Rev.) Cheever, F. S. (U. Pittsburgh, Pa.). *Med. Clin. N. Amer.* 51(3): 637-641, 1967.

5894 INFANTILE GASTROENTERITIS. AN ETIOLOGICAL STUDY OF HOSPITALIZED CASES. (Heb.) Barak, Y. and R. Soriano. *Harefuah* 72(7):271-275, 1967.

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ements of the esophagus were examined by ns of the cinefluorography and manometric hod in 30 normal subjects and 32 patients h achalasia of the esophagus; of the latter, were operated upon and the movements were pared before and after the operation. The ration was usually (in 25 cases) performed ording to the modified Petrovsky's diaphragmo- sty technic, and satisfactory results were ained in all but 1 case. A correlation was nd between the degree of esophageal dilatation duration of the symptoms, as expressed in following equation: Dilatation index = 3.1 (years of duration) x 54 (V = 0.78). Resting ssures in the thoracic esophagus in the ients with achalasia were higher than those the controls, the preoperative mean value ng +4.7 ± 1.7 mm Hg, while control value was .7 ± 0.6 mm Hg, both as compared with the aryngeal pressure of each group. After the eration, the resting pressure decreased idly to reach -0.6 ± 0.7 mm Hg, as compared th the pharyngeal pressure. A reverse rrelation was found between the max. plitude of non-peristaltic contraction and age the patients, but no significant correlation s found between contraction and dilatation. ter the operation, the size of the esophagus parently decreased. The dilatation index 1 . after the operation was closely correlated the preoperative index (V = 0.95), as ex- essed as postoperative index = 1.2 x (pre- erative index) - 42.

88 ANATOMIC LOCATION OF THE LOWER ESOPHAGEAL RING. (E.) Johnston, H., Jr. (U. Mississippi Sch. Med., Jackson) d J. C. Griffin, Jr. *Surgery* 61(4):528-534, 67.

etrograde esophagoscopy at the time of surgery 11 cases (5 women, 6 men; 40-62 yr. old) of e lower esophageal ring (10 of which were ssociated with hiatal hernia) showed that in 4 e ring was located at the true cardia or sophagogastric junction; in 2 it was found 2 above, and in 3, 3 cm above; in the remaining , it was located 5 cm above the anatomical sophagogastric junction. These results are at ariance with the commonly accepted view that uch rings uniformly occur at the gastric cardia d are valuable radiologic landmarks. In all cases, the rings occurred at the junction of quamous and glandular epithelium; thus, in 7 he distal esophagus was lined with gastric pithelium (gastroesophagus). Four of 10 had an associated duodenal ulcer, past or present; the remaining patient had an intractable postbulbar duodenal ulcer with a lower esophageal ring 4 cm within the esophagus and no hiatal hernia. Esophagitis, past or present, was recorded in 7 of 11; this is contrary to the accepted view that rings are unassociated with clinical or radiological evidence of esophagitis. All had a history of dysphagia, and in 3 it was marked. All were operated on by the transabdominal approach. In 9 patients the ring was digitally dilated through a small gastrostomy opening, one other underwent pneumatic dilatation and another retrograde dilatation with bougies. In 9 of the 11, truncal vagotomy and Heinicke-Mikulicz pyloroplasty were done; vagotomy and hemigastrectomy were performed in the remaining 2 because of severe duodenal ulcerative disease. The incidence, clinical picture (illustrated with 1 case report) and pathology of lower esophageal ring are also discussed.

5989 OPENING OF THE CARDIA AND HIATUS HERNIA. (E.) Johnson, H. D. (Roy. Postgrad. Med. Sch., London). *Surgery* 61(2): 177-182, 1967.

The physiology and mechanism of opening of the cardia and hiatus hernia was studied in experiments on 5 dogs and during 193 operations for hiatus hernia. Of the latter, only patients with paraesophageal hernias all had conspicuously large hiatuses; in most of those with sliding hernias with the cardia at the apex, the hiatus was within normal limits. Of 161 hernia patients operated on abdominally, 20 (12%) had gallstones. Duodenal ulcers alone were found together with hiatus hernias 24 times (14 in patients operated on primarily for the ulcers). Seven patients had gastric ulcers, but 5 of these also had either duodenal ulcers or their scars; 1 had adult pyloric hypertrophy. The formula PI-PE = T/R (where PI and PE are pressures inside and outside of a nonrigid tube, T is the tension in its wall and R is its radius) is useful in understanding opening of the cardia. The abdominal esophagus closes and resists reflux if the total compression of its lumen (PI) exceeds intragastric pressure; PE is the same for both organs. Therefore, for PI in the esophagus to exceed PI in the stomach, TE must exceed TS x DE/DS (where TE and TS are tensions in the walls of esophagus and stomach, resp., and DE/DS is the ratio of the effective diameter of the esophagus to stomach). However, when the terminal esophagus is wholly intrathoracic, it is subjected to lower external pressure than the stomach. In order to close, the sphincter must now exert, in addition, sufficient compression to overcome the difference between intra-abdominal and intrathoracic pressure. When this is high, as in recumbancy, the sphincter may give way. Opening of the cardia is an active process and involves elevation; this tents and parts the mucosal folds, and also eliminates the abdominal esophagus. It caused substantial hiatal herniation in dogs. Pathological reflux occurs as soon as the abdominal esophagus is extruded into the chest. Secondary esophageal spasm is then held to encourage further elevation of the cardia; such elevation also accompanies biliary stimulation. It is suggested that this represents vigorous opening of the cardia as part of the vomiting reflex; this is considered an additional factor in the pathogenesis of hiatus hernia complicating gallstones, peptic ulcer or pregnancy.

5990 LATE RECOGNITION AND TREATMENT OF TRAUMATIC DIAPHRAGMATIC HERNIAS.

(E.) Schwindt, W. D. (U. Wisconsin Med. Ctr., Madison) and J. W. Gale. Arch. Surg. (Chicago) 94(3):330-334, 1967.

Twelve patients (22-63 yr. of age) with ruptured diaphragms (all but hernia were in left thorax) resulting from trauma were examined between 1 mo.-10 yr. after injury. Five patients with asymptomatic pictures had abnormal thoracic roentgenograms, while thoracopulmonary symptoms (shortness of breath, exertional dyspnea and chest pains) and gastrointestinal symptoms (nausea, mild vomiting, wt. loss and infrequent constipation) were present in the other 3 and 2 patients, resp. Of the 7 patients with fractures (4 with pelvic and 6 with costal fractures), 5 had sustained automobile injuries. One patient had persistent pneumothorax. Routine thoracic films were confirmatory in 7 patients, while employment of upper gastrointestinal X-ray, Ba enema and diagnostic pneumoperitoneum were necessary for positive diagnosis in the other 7. The colon, either with omentum or spleen (or both), was the most common abdominal organ found within the thorax, while the stomach was second in frequency. In 2 patients, the stomach, colon, omentum, spleen and a large portion of the small intestine were seen in the thorax. Eleven patients underwent a successful thoracotomy for reduction and repair of the hernia. Two patients from this group had abdominal procedures which proved unsuccessful due to massive adhesion formation. The twelfth patient (10 yr. after injury) refused surgery despite the presence of his liver in the right thorax. There were no operative complications or deaths in this series.

5991 THE ANATOMICAL BASIS FOR THE RADIOLOGICAL DIAGNOSIS OF MINIMAL HIATAL HERNIATION.

(E.) Berridge, F. R. (Addenbrooke's Hosp., Cambridge, England) and G. W. Friedland. Irish J. Med. Sci. 6(494):51-62, 1967.

The gastro-esophageal junction was examined in 132 cadavers and 7 instances of hiatus hernia were found which did not compare favorably with corresponding radiological findings. The primary importance of the phreno-esophageal membrane in anchoring the stomach in the abdomen is stressed. When this membrane is intact (though elastic) it is impossible to pul the gastro-esophageal junction above the hiatus at autopsy. In many normal persons, the mucosa junction does pass above the hiatus (usually during deep inspiration or when the stomach is pushed up). The position of the lower esophagu and hiatus as well as the function of the vestibule, especially during different phases of breathing, were studied by means of radio-opaque markers. The function of the vestibule seems to be the formation of an intermediate chamber between the stomach and the esophagus which permits the passage of food into the stomach when the intragastric pressure greatly exceeds that of the intrathoracic pressure. Failure to realize the existence of the 3 different vestibular states (relaxed, contracte and closed) has resulted in the problem of whether there is an anatomical sphincter at the lower esophagus. In determining a minimal hiatal herniation one must find the mucosal fol at the gastroesophageal junction above the hiatus and distinguish it then from the inferior esophageal sphincter which normally lies above the diaphragmatic hiatus.

5992 ACID SECRETION IN SYMPTOMATIC SLIDING HIATUS HERNIA.

(E.) Williams, C. B. J. H. Lawrie and A. P. M. Forrest (Roy. Infirm. Cardiff, Wales). Lancet 1(7483):184-185, 1967.

Max. outputs of acid were estimated by the histamine infusion test in 37 unselected patients with sliding hiatus hernia and in 30 patients without dyspeptic disorders. Seven of the hiatus hernia patients also had duodenal ulceration. The av. basal output of hiatus hernia patients without duodenal ulcer was 1.47 mEq/hr. compared to controls of 1.26 mEq/hr. Following histamine the values were 19.9 mEq/hr compared to control levels of 19.9 mEq/hr. Hernia patients with ulcer had av. basal value of 3.07 mEq/hr. and 37.1 mEq/hr. following histamine. The acid outputs of the hiatal hernia patients with duodenal ulcer fell in the range of patients with only ulcer. When the patients were subdivided according to the number of their symptoms, no relation was found between the number of symptoms and the max. output of acid, nor was the severity of the symptoms related to acid output. In 10 patient in whom operation was necessary the max. output was 22.8 mEq/hr. as against 23.2 mEq/hr. in 27 patients in whom operation was not considere necessary. It is concluded that if vagotomy is of benefit to hiatal hernia patients, it is beneficial by reducing the secretion of acid from a level which is within the normal range.

5993 A NEW DOUBLE-CONTRAST METHOD IN ESOPHAGEAL ROENTGENOLOGY.

(E.) Wiljasalo, M. (Univ. Cent. Hosp., Helsinki,

and) and P. Rissanen. Ann. Med. Intern.
. 55(3):77-80, 1966.

ng 2.5% Na methylcellulose with some sorbitol
ed as a roentgen-negative material and micro-
st as the roentgen-positive contrast, a new
ble-contrast method in esophageal radiology
developed. While standing, the patient
st must swallow a spoonful of microtrast and
n a spoonful or two of Na methylcellulose.
pictures in the anteroposterior as well as
the oblique direction are taken in rapid
cession. Using this method 10 normal sub-
ts, 32 nonradiated cases of esophageal
cinoma, 50 radiated esophageal carcinomas, 10
ices of the esophagus, and 5 cases of hiatus
nia were examined. Upon analysis, the normal
phagus appears more dilated in the erect
ition than when examined by the usual methods.
relief of the mucous membrane is clearly
ible and the diverticula are well dilated.
the examination of incipient carcinomas, the
ble-contrast method is of particular impor-
ce since a depression in the wall is often
ceptible only in one projection. This
roach was especially valuable in the detection
localization of the carcinoma (being helpful
diagnosis in approx. 75% of 127 patients
mined). Improved information concerning
tus hernia was not obtained using this
hod.

94 THE INK-WELL ANASTOMOSIS IN OESOPHAGEAL
RECONSTRUCTION. (E.) Procter, D. S. C.
ivingstone Hosp., Port Elizabeth, South
ica). S. Afr. Med. J. 41(8):187-191, 1967.

30 patients subjected to "ink-well" anastomosis
r treatment of advanced carcinoma of the
ophagus, none died as the result of anastomotic
akage. Elimination of such leaks depended for
e most part on a considerable emphasis of the
gmental blood supply to the esophagus during
rgery. Avoidance of unnecessary mobilization
ring surgery, complete absence of any stress
ong the suture line and the presence of a
condary barrier to leakage in the form of a
ritoneal seal are other primary considerations.
e anastomosis consisting of 2 posterior and 2
terior rows of sutures are sufficient with the
ture line including all coats of both struc-
res, especially the mucosa. Tendency for
gurgitation may be diminished by employing
ch an "ink-well" configuration. All 6 opera-
ve deaths resulted from postoperative acidosis
), pulmonary collapse (2), cerebrovascular
cident (1), massive aortic hemorrhage (1) and
erative shock (1). There was 1 instance of
oughing of colon (bypass procedure) after
ich the patient remained healthy for 5 mo.,
fore succumbing to pulmonary tuberculosis.
akage in the neck occurred on the ninth
stoperative day in 1 patient in whom bruising
f the colon had occurred during surgery, and
this leak closed spontaneously after 2 weeks, without stricture formation. Four patients died during follow-up after periods of 10 wk., 5 mo., 9 mo., and 14 mo., resp., with normal swallowing and full diet being characteristic of the last two and all 20 remaining patients. At autopsy no esophagitis or stenosis of the esophagus was observed in the one surviving 14 mo.

5995 THE "CAPTIVE BOLUS" TEST AND THE PINCHCOCK AT THE DIAPHRAGM. AN ESOPHAGEAL PUMP AND SOME NON-DISEASES OF THE ESOPHAGUS. (E.) Stiennon, O. A. (St. Mary's Hosp., Madison, Wisc.). Amer. J. Roentgen. 99(1):223-232, 1967.

A new and simple procedure, the "captive bolus" test, is described; it gives a measure of the phrenoesophageal ligament and helps to explain the "wing" and "Saturn ring" signs. The latter is due to a pinching off of the circumference of the gastric tube as it begins to reduce; the former sign is due to an aperistaltic segment which is flattened between the lower esophageal ring and sphincter by the pinchcock pump. This test also indicates that most, if not all, reported cases of "orthograde prolapse of the esophageal mucosa" and "retrograde prolapse of the gastric mucosa" are false. The cause of the pinchcock at the diaphragm is explored and the existence of a hitherto undescribed, hydraulically actuated, retrograde pump at the cardia is described and analyzed. This pump may be significant in accounting for pyrosis in certain cases of hiatus hernia.

5996 INSTRUMENTAL RADIOLOGICAL DIAGNOSIS IN THE CORRELATION OF PORTAL HYPERTENSION WITH VICARIOUS GASTROESOPHAGEAL CIRCULATION. (It.) Porta, E. (U. Naples, Italy), E. Verrengia, P. Cappabianca and M. Crocco Egineta. Ann. Radiol. Diagn. (Bologna) 39(2):93-166, 1966.

In an effort to correlate the relationship existing between portal hypertension and vicarious gastroesophageal circulation, results of various methods of radiological examination are reported in 166 patients with esophageal varices. Conventional esophagography revealed a picture ranging from slight irregularities of the esophageal margin to a completely irregular structure of the mucosa, which appeared lacunar or polypous. Esophagography combined with roentgencinematography revealed important data regarding esophageal tonus and peristalsis as well as Ba transit. Both intra- and extrahepatic alterations were studied by means of splenoportography with splenomanometric control. Important portal pressure changes were observed by catheterization of the suprahepatic veins. Data on intrahepatic blood vessel alterations were obtained by retrograde venous hepatography, or epihepatography. Selective celiacography proved valuable in obtaining data on the behavior of the hepatic and splenic arterial blood supply in patients with hepatic cirrhosis. It is concluded that the development of esophageal varices depends not only on the degree of portal hypertension but on other factors (portal blood vessel morphology, resistance of blood vessel walls) as well. The technic of each method is described and illustrative X-rays are presented.

5997 THE CRURAL BRANCHES OF THE PHRENIC NERVES. THEIR SURGICAL SIGNIFICANCE. (E.) Wynyard, M. and H. D. Kletschka. Minnesota Med. 49(12):1821-1824, 1966.

The terminations of the crural branches of the phrenic nerve are illustrated and described. Based upon the pattern of innervation, it is proposed that crural musculature to the left of the esophagus be referred to and considered as the left crus; and similarly, the crural musculature to the right of the esophagus be identified as the right crus. Terminal branches of the crural nerves are distributed mainly to that portion of each crus situated caudad to the midlevel of the esophageal hiatus and are closely associated with the margin of that hiatus. In dealing surgically with the esophageal hiatus, injury to the crural nerve terminal branches will most likely occur in those cases in which the hiatus is closed posteriorly to the esophagus. Due to the superficial course which the nerves take on the abdominal aspect of the crura, an abdominal approach increases the hazard in such repairs. These postulates are of special importance in hiatal hernia and reflux esophagitis (when it should be determined whether previous injury to the phrenic nerve has occurred).

5998 SURGICAL TREATMENT OF THE ENDOBRACHYESOPHAGUS. (Fr.) Naef, A. P. (Yverdon Hosp., Switzerland). Helv. Chir. Acta 34(1-2): 85-86, 1967.

5999 INTEREST AND DIFFICULTIES IN THE RADIOLOGIC STUDY OF PEPTIC STENOSIS IN THE ESOPHAGUS OF THE ADULT. (Fr.) Brette, R., P. Bret, F. Servonnat and M. Croisille. J. Med. Lyon 48(1117):485-501, 1967.

6000 LATE RESULTS OF EXTRAMUCOSAL STITCHING OF DILATED VEINS AND RESECTION OF MUCOSA OF THE LOWER SEGMENTS OF THE ESOPHAGUS IN EXTRAHEPATIC HYPERTENSION IN CHILDHOOD. (Rus.) Rapant, V. (Palacky U., Olomouc, Czechoslovakia). Eksp. Khir. Anest. 12(2):30-34, 1967.

6001 STENOSIS OF THE ESOPHAGUS DUE TO CAUSTIC AGENTS. INDICATIONS AND RESULTS OF SURGERY. (It.) Masenti, E. (U. Turin, Italy) and G. Balbo. Minerva Chir. 22(5):246-260, 1967.

6002 NEUROMUSCULAR DISORDERS OF THE ESOPHAGUS. (E.)(Rev.) Bradham, R. R (VA Hosp., Oteen, N.C.) and W. C. Sealy. Ann. Thorac. Surg. 3(5):460-483, 1967.

6003 HELLER OPERATION BY THORACIC ROUTE IN THE TREATMENT OF IDIOPATHIC MEGA-ESOPHAGUS. (It.) Melina, D. (U. Naples, Italy Rass. Arch. Chir. 4(4)(Suppl. 2):263-266, 1966.

6004 ESOPHAGOPLASTY USING THE STOMACH AND SMALL INTESTINE. (Rus.) Borodin, I. M. (Kirov Order of Lenin Med. Acad., Leningr USSR). Vestn. Khir. Grekov. 98(1):27-30, 1967.

6005 POSTERIOR STERNAL ESOPHAGOPLASTY WITH THE COLON. (Rus.) Filimonov, M. L. (Kustanay Reg. Hosp., USSR). Vestn. Khir. Grekov. 98(3):108-115, 1967.

6006 SURGICAL RECONSTRUCTION OF THE DISEASED ESOPHAGUS. PART II. INTERPOSITION OF THE ILEOCOLON AND COLON. (E.) Grimes, O. F. (U. California Sch. Med., San Francisco). Surgery 61(3):487-494, 1967.

6007 COLON BYPASS. A TECHNICAL NOTE. (E.) Gillesby, W. J. (VA West Side Hosp., Chicago, Ill.) and S. J. Maurice. Amer. J. Sur 113(3):445-446, 1967.

6008 SOME ASPECTS OF RECONSTRUCTIVE SURGERY OF THE ESOPHAGUS. (Rus.)(Rev.) Popov, V. I. (Kirov Order of Lenin Med. Acad., Leningrad, USSR) and V. I. Filin. Vestn. Khir. Grekov. 98(3):108-115, 1967.

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6010 THE X-RAY DIAGNOSIS OF COMPLICATIONS FOLLOWING THE OPERATION OF CREATION OF AN ARTIFICIAL ESOPHAGUS FROM THE LARGE INTESTINE. (Rus.) Khasileva, A. F. Vestn. Rentgen. Radiol. 42(1):52-58, 1967.

6011 ESOPHAGOPLASTY WITH ILEO-CECUM. (Ger.) Widmer, A. (Aarau Canton Hosp., Switzerland). Helv. Chir. Acta 34(1-2): 87-93, 1967.

6012 EXPERIENCE WITH THE TREATMENT OF CHEMICAL BURNS OF THE ESOPHAGUS. (Rus.) Sokolov, I. S. (6th Reg. Hosp., Krivoy Rog, USSR). Sovet. Med. 30(3):76-79, 1967.

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021 SURGICAL TREATMENT OF CANCER OF THE MEDIAN REGION OF THE ESOPHAGUS. (Rus.) Shalimov, A. A. (Ukrainian Inst. Postgrad. Med., Kiev, USSR) and A. G. Vinnichenko. Klin. Khir. (Kiev) (3):7-11, 1967.

6022 CANCER OF THE ESOPHAGUS: MODERN METHOD OF MAINTAINING NUTRITION. (E.) Butler, F. S. (Columbus Hosp., New York, N.Y.). J. Amer. Geriat. Soc. 15(5):462-469, 1967.

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6024 EXTIRPATION OF THE STOMACH IN GASTROESOPHAGEAL CANCER. (Rus.) Dozgorukov, M. I. (Leningrad Med. Inst. Pediat, USSR). Vestn. Khir. Grekov. 98(3):16-20, 1967.

6025 DIFFERENTIAL DIAGNOSIS OF HIATUS HERNIA. (Cz.) Chalupová, E. (Comenius U., Bratislava, Czechoslovakia). Rozhl. Tuberk. 27(3):186-190, 1967.

6026 CAUSAL RELATIONSHIP BETWEEN HIATUS HERNIA AND ESOPHAGEAL OR GASTRIC CARCINOMA. (Ger.) Konrad, R. M. (U. Clin. Dusseldorf, Germany) and J. Rasp. Zbl. Chir. 92(12):433-440, 1967.

6027 CAUSES OF THE POOR RESULTS IN SURGERY OF HIATAL HERNIAS OF THE ESOPHAGUS. (Cz.) Rapant, V. (Palacky U., Olomouc, Czechoslovakia) and M. Korhoň. Rozhl. Chir. 46(3):134-140, 1967.

6028 AN ELECTROCARDIOGRAPHIC STUDY ON HIATUS HERNIA, WITH PARTICULAR REFERENCE TO THE S-T CHANGES ON THE EXERCISE TEST BEFORE AND AFTER MEALS. (Jap.) Hirata, Y. (Tokyo Med. Dent. U. Sch. Med.). Nippon Junkankigaku Shi (Jap. Circ. J.) 31(1):85-97, 1967.

6029 DIAPHRAGMATIC HERNIA. OBSTRUCTION AND STRANGULATION OF ABDOMINAL VISCERA. (E.) Habein, H. C. (St. Vincent's Hosp., Billings, Mont.), R. E. Benson and P. Teel. Rocky Mountain Med. J. 64(5):67-70, 1967.

STOMACH

(Gastric ulcer is placed with peptic ulcer)

6030 MITOTIC ACTIVITY AND RENEWAL RATE OF EPITHELIAL CELLS OF DIGESTIVE TRACT IN CANCER PATIENTS. I. OBSERVATION ON THE STOMACH AND DUODENUM IN THE PATIENTS WITH GASTRIC CANCER OR PEPTIC ULCER. (E.) Suzuki, K. (Yamaguchi U. Sch. Med., Japan). Gann 57(5):453-466, 1966.

To ascertain mitotic activity, at least 2000 cells were counted in each of the gastroduodenal tissues removed by surgery from 50 patients with various diseases. The mitotic activity of gastroduodenal epithelium of gastric cancer patients was lower than that of noncancer patients. To obtain high mitotic values and turnover time of human gastroduodenal epithelium, the Colcemid (demecolcine) technic was used after preliminary studies with rats. Patients (72) with various gastrointestinal lesions were inj. with 0.15 mg/kg of Colcemid i.v. 3-7 hr. before gastrectomy. The difference in mitotic values between gastric cancer and noncancer groups was highly significant. On the basis of the mitotic values obtained by the Colcemid technic, the turnover rates were calculated. In gastric cancer patients turnover time was 7 days in the body mucosa, 4.7 days in the pyloric mucosa, and 4.5 days in the duodenal mucosa. In the noncancer patients the renewal times of pyloric and duodenal mucosa were about 2.4 and 2 days, resp.

6031 MITOTIC ACTIVITY AND RENEWAL RATE OF THE EPITHELIAL CELLS OF DIGESTIVE TRACT IN CANCER PATIENTS. II. MITOTIC RATE OF THE EPITHELIAL CELLS OF BUCCAL MUCOSA IN THE PATIENTS WITH CANCER OF VARIOUS ORGANS. (E.) Suzuki, K. (Yamaguchi U. Sch. Med., Japan). Gann 57(5): 467-475, 1966.

Low mitotic activity of gastric and duodenal mucosa in the cancerous stomach compared to normal was reported in the preceding paper. In the present study specimens of buccal mucosa were taken in connection with operation on various organs in 98 patients, 6-7 hr. after the admin. of Colcemid. Approx. half the patients suffered from cancer. Mitotic counts were made in the mitotic area of the mucosa after appropriate preparation and sectioning. Almost all the specimens in the cancer group showed less mitotic counts than the noncancer specimens. The mitotic rate of the buccal mucosa was not influenced by age or sex in the cancer group, as was observed in the gastric and duodenal mucosa in the earlier study. Regression with age did occur in the noncancer group. Only 6 patients of the noncancer group showed a mitotic rate less than 2%. It is suggested that the mitotic activity of tissues may be suppressed in the cancer-bearing individuals by an unknown factor. Two cases were reported which showed low mitotic rates of buccal mucosa but were not found to have cancer; later both were found to have cancer.

6032 GASTROSTOMY IN POSTOPERATIVE DECOMPRESSION. INDICATIONS AND METHODS. (E.) Cox, W. D. (VA Hosp., Chicago, Ill.) and W. J. Gillesby. Amer. J. Surg. 113(2):298-302, 1967.

A technic for tube gastrostomy was developed and used in 305 patients. The muscle fibers of the anterior wall of the stomach are separated by blunt dissection allowing the mucosa to bulge in the opening. The mucosa is incised and the muco edges elevated, a Foley catheter passed into the stomach and a chromic catgut ligature tied aroun the mucosa and tube. Purse-string sutures are placed and the gastrostomy opening inverted. In some cases a radial purse string suture is used. The tube is passed to the exterior via a stab wound and the stomach wall sutured to the peritoneum. A double-lumen tube can be similarl placed with the smaller lumen placed into the duodenum for simultaneous drainage of both stoma and duodenum. A 40-inch Foley catheter can be propelled through the distended intestine with low suction applied as an aid in decompression. In recurrent mechanical obstruction the tube can be left in place preventing acute angulation of the intestine until the return of peristalsis. By connection of the gastrostomy tube with a biliary T-tube, bile is returned to the stomach and duodenum without unpleasantness for the patient, and anorexia, weakness and failure to gain wt. is prevented.

6033 STUDIES OF NUTRITIONAL INSUFFICIENCY IN GASTROSTOMIZED CHILDREN. (Fr.) Savic, D. (U. Belgrade, Yugoslavia), B. Mihaljev and E. Stojimirovic. Acta Otorhinolaryng. Belg. 21(1):76-82, 1967.

Metabolic studies were performed on 20 children with lye-induced esophageal scarring, who had undergone gastrostomy 2-6 mo. later after dilata tion failed (age 1-4 yr.) and had been hospitali 2-6 times thereafter for 6 mo.-2 yr. All childr were on adequate diets, but all were below av. i height and wt. Osteoporosis and retarded bone growth were noted in 11 patients (in 3 of these, bone growth was retarded 2-4 yr.); none showed "hunger edema." Serum proteins were normal (no hypoalbuminemia was present), but hemoglobin levels were decreased in 11 patients and serum iron in 12 (about 30 μg% in 3 cases). Infectiou diseases were frequent; most of the children wer inactive and spent the day in bed. Gastric secr tion was normal in only 5 patients; hypochlorhydria was present in 5 and achlorhydria in 8 (histamine-resistant in 2). Marked depression o protein metabolism because of deficient gastric (and perhaps also pancreatic) secretion was evident.

6034 FACTORS INFLUENCING THE PSYCHIC DEVELO MENT OF GASTROSTOMIZED CHILDREN. (Fr.

vic, D. (U. Belgrade, Yugoslavia), H. Rot,
. Mihaljevic and E. Stojimirovic. Acta
torhinolaryng. Belg. 21(1):83-90, 1967.

sychological studies were performed in 29 children
age 9 mo.-9 yr.) who had undergone gastrostomy
t age 5 mo.-6 yr. (usually age 1-4 yr.) following
orrosive injury to the esophagus; the av. dura-
ion of the condition was 3 yr. and the children
ad been hospitalized on 2-5 occasions (av. 3)
or an av. of over 8 mo. All children were from
rural district or small towns and their families
ere of about the same socio-economic status.
sychomotor development was significantly retarded;
he I.Q. was 76 in 3% of the group, 84-87 in 25%,
0 in 20% and 90-100 in 48%. The children were
asily approached by strangers, highly suggestible,
pathetic and passive (even when about to undergo
ilatation); speech was poor, vocabularies were
mall, and behavior was stereotyped. Figure-
rawing tests in the older children indicated
hat this retardation resulted not only from the
ccasional symptoms noted (e.g., pain) and from
rolonged separation from the family, but also
rom the gastrostomy itself and the periodic
ilatations required, which apparently produced
chronic emotional stress that retarded intellec-
ual and psychic development. These findings
ere in significant contrast to those obtained in
comparable group of children hospitalized for
uberculosis.

6035 FATE OF AUTOTRANSPLANTED STOMACH MUCOSA FOLLOWING TOTAL GASTRECTOMY IN DOGS. (E.) Payan, H. M. (VA Hosp., Clarksburg, W. Va.), W. H. Gerwig, Jr., C. Mendoza, Jr., B. Zimmermann and W. S. Albrink. Arch. Path. (Chicago) 83(3):298-306, 1967.

Mongrel dogs were subjected to total gastrectomy. Under sterile conditions, the mucosa was stripped from the proximal and middle thirds of the stomach; the fundic third was transplanted in the right axilla and the middle third of the stomach in the left axilla. Serial biopsies were taken from the transplanted gastric mucosa at intervals of days, wk. and mo., and were studied morphologically and histochemically. Earlier biopsies revealed degeneration of the epithelial elements of the mucosa with inflammation and granulation tissue of the submucosa and muscularis mucosa. Cuboidal epithelial cells were observed after a wk., with gradual change into tall columnar cells; these cells showed a marked morphologic and histochemical resemblance to the normal mucus cells of the stomach. Preservation of the mucosal and submucosal connective tissue appeared to be an important element in regeneration of the epithelial cells. The physiologic activities of the grafts were attributed to the mucus cells of the stomach.

6036 ROLE OF 5-HYDROXYTRYPTAMINE IN THE DUMPING SYNDROME AFTER GASTRECTOMY: HISTOCHEMICAL STUDY. (E.) Tobe, T. (Japan Baptist Hosp., Kyoto), C. Kimura and M. Fujiwara. Ann. Surg. 165(3):382-387, 1967.

The cytological localization of serotonin and catecholamines in the human gastrointestinal tract was demonstrated,,using a specific fluorescence technic for demonstrating biogenic monoamines. Many serotonin-containing cells were found in Lieberkühn's crypts in the duodenum and jejunum. Intrajejunally admin. hypertonic glucose soln. induced a complete to near-complete release of serotonin in all cases. In accord with the release of serotonin many gastrectomized patients to whom hypertonic glucose was given during a glucose tolerance test complained of nausea or abdominal pain with palpitation. In severe cases, signs and symptoms resembled the dumping syndrome. It is suggested that, after gastrectomy, a liquid diet can flow very promptly from the stomach without a pyloric ring into the duodenum or jejunum and then induce considerable release of serotonin which results in the dumping syndrome in serotonin-sensitive patients.

6037 THE ROLE OF BRADYKININ IN VASOMOTOR ASPECTS OF THE CARCINOID AND DUMPING SYNDROMES. (E.) Smith, A. N. (U. Edinburgh, Scotland) and I. J. Zeitlin. Brit. J. Surg. 53(10):867-869, 1966.

Bradykinin and its precursor extracted from blood samples drawn from various patients were assayed using the estrous rat uterus. All assays were performed against a pure standard. In 4 carcinoid cases kinin was found to increase in blood drawn during flushing; there were no rise in kinin level without vasomotor symptoms. Dumping attacks were provoked by glucose in 4 fasting gastrectomy patients. All 4 complained of postprandial malaise, flushing, sweating, headache and abdominal discomfort. Attacks of dumping occurred 10-15 min. following glucose. The kinin level increased at the height of an attack (controls of approx. 0-2 ng/ml to approx. 60-108 ng/ml) but fell rapidly returning to normal levels at the completion of an attack. Patients given a large volume (250 ml) of saccharin-sweetened soln. showed neither symptoms nor increased kinin levels. Normal subjects on whom no gastric surgery had ever been performed did not release kinin when given dumping provocation with glucose soln. The degree of the clinical effects seen was correlated with the amount of kinin released. The site of the release of kinin has not been established; it was pointed out that its formation may be activated in the circulation or in other tissues anywhere in the body.

6038 A PHYSIOLOGICAL APPROACH TO THE SURGICAL TREATMENT OF THE DUMPING SYNDROME. (E.) Stemmer, E. A. (5901 E. 7th St., Long Beach, Calif.), J. M. Guernsey, R. E. Heber and J. E. Connolly. J.A.M.A. 199(12):909-913, 1967.

An intractable form of the dumping syndrome developed in 2 patients after vagotomy and pyloroplasty, and they were successfully treated by the interposition of an antiperistaltic segment of jejunum between the stomach and duodenum. Gastrointestinal motility studies were performed before and after the surgical procedures in 1 patient. The effectiveness of the interposition operation in preventing the gastrointestinal and vasomotor reactions to the experimentally provoked dumping syndrome was studied in a group of dogs in which jejunal reversal had been performed distal to a Mann-Bollman fistula of the duodenum. Jejunal interposition lessened or abolished both the subjective and objective responses in the patients and in the experimental animals.

6039 SEROTONIN AND THE DUMPING SYNDROME.

(E.) Reichie, F. A. (3401 N. Broad St., Philadelphia, Pa.), P. Brigham and G. P. Rosemond. J.A.M.A. 199(12):914-916, 1967.

Consistent increases in peripheral serotonin levels in platelet-rich plasma were seen in 14 patients with the dumping syndrome who were given hyperosmotic glucose p.o. Similar changes in peripheral serotonin levels occurred in 6 patients with normal gastrointestinal tracts after the intraduodenal instillation of hyperosmotic glucose. Almost no change was seen in control patients after p.o. admin. of the same test meal. Hematocrit changes occurred consistently in the test group, but these were smaller than the increases in serotonin; this indicated that the serotonin changes were not merely reflections of hemoconc. Assays of serotonin done on platelet-rich plasma, which is thought to provide max. sensitivity and reliability, together with the admin. of a large dose of hyperosmotic stimulus, enabled the detection of an index in peripheral venous blood of serotonin release into the circulatory system from the gastrointestinal tract. Therefore the release of serotonin into the circulatory system does accompany the dumping syndrome; however, it remains to be determined whether the increases are sufficient to account for all of the symptoms.

6040 GASTROSTOMY WITH A PROSTHESIS. (E.)

Redo, S. F. (New York Hosp.-Cornell Med. Ctr., N. Y.) and W. A. Barnes. Surgery 61(2):320-324, 1967.

A description is presented of a refined technic of creating a permanent gastrostomy by means of a prosthesis previously described; in addition, the results of 51 gastrostomies using this prosthesis done at the New York Hospital and an additional 30 done at other institutions throughout the United States are described. Of 51 gastrostomies done at the New York Hospital, patients included 33 men and 18 women (25-86 yr. old, with an av. age of 63 yr.; 41 were 50-80 yr. old). Follow-up ranged from less than 1 wk. to 6 yr. postoperatively. The fatal complication rate was 1 of 51 (2%); this was due to operative procedure and not to the prosthesis *per se*. The nonfatal complication rate was 4 of 51 (7.8%), and included slight wound infection in 1, minimal leakage about the prosthesis in 1, mild skin excoriation about the prosthesis in 1 and extensive infectio and leakage in 1, that was controlled and cured by meticulous local care. A review of 54 gastrostomies done by other methods at New York Hospital before 1956 revealed a nonfatal complication rate of 37%. In 3 instances, the gastrostomy was no longer required and the prosthes was removed without incident 3-18 mo. after insertion; this followed X-ray treatment in the first patient, retrograde bouginage in the secon and resumption of the ability to swallow in the third. The results of use of the prosthesis in the additional 30 patients were similar; none of the gastrostomies was accompanied by infection o leakage, and all functioned well during the follow-up periods of from 1-19 mo. It is conclu that gastrostomy using this plastic prosthesis is a simple, safe and satisfactory method of fee ing, usually unaccompanied by leakage, discomfor infection or skin irritation.

6041 BLIND POUCH SYNDROME. A COMPLICATION OF SIDE TO SIDE INTESTINAL ANASTOMOSIS

(E.) Botsford, T. W. (Peter Bent Brigham Hosp., Boston, Mass.) and A. B. Gazzaniga. Amer. J. Surg. 113(4):486-490, 1967.

Three cases of the "blind pouch" syndrome with severe anemia due to intestinal bleeding are described. The "blind pouch" syndrome may be defined as a series of symptoms associated with formation of a blind pouch secondary to side-to-side intestinal anastomosis; it should be distinguished from the "blind loop" syndrome. Symptoms associated with the formation of the blind pouch include anemia, diarrhea, failure to gain wt. and intermittent abdominal pain. Treatment of this complication is excision of the lateral anastomosis followed by end-to-end anastomosis of the normal intestine.

6042 DISTURBED GLUCOSE TOLERANCE IN SUBTOTAL GASTRECTOMY.

(E.) Alpert, S. (VA Reg. Office, New York City), F. Kerrigon and R. Berke. Amer. J. Gastroent. 47(3):215-220, 1967.

Glucose tolerance tests were performed p.o. on 34 gastrectomized subjects and 31 patients with chronic duodenal ulcer without gastric resection. An i.v. glucose tolerance test was given to 6 gastrectomized patients. The characteristic pattern of initial hyperglycemia followed by a sharp descent to hypoglycemic levels was observed in 21 cases of gastrectomized patients. Similar changes, to a lesser degree, were noted in the medically-treated cases of duodenal ulcer. Such changes were not seen with the i.v. admin. of glucose. There were quantitative variations from the pattern in both groups of patients. It is suggested that at least 2 factors are responsible

the characteristic sharp rise and fall in
blood glucose level. The most important
ctor is the accelerated gastric evacuation and
id intestinal absorption of ingested glucose;
resultant portal hyperglycemia acts as a
ent stimulus for insulin release by the islet
ls of the pancreas. A rapid descent of blood
ar is a consequence of the resultant hyper-
sulinism. The cases of medically-treated duo-
al ulcer that exhibited this characteristic
tern (quantitatively to a much lesser degree)
ld be attributed to gastric hyperperistalsis
pled with rapid evacuation. Autonomic stimula-
on consequent upon rapid intestinal distention
proposed as a second factor in the cause of
poglycemia, possibly by way of increased glyco-
esis and islet stimulation.

43 RESULTS OF NO-LOOP GASTRECTOMY FOR
DUODENAL ULCER. (E.) Taylor, H. and
G. A. Eadie. Brit. Med. J. 1(5531):15-18, 1967.

llow-up data are presented on 336 "no-loop"
strectomy operations for duodenal ulcer performed
er a 20-yr. period. Of 18 deaths occurring, the
use in 3 was unknown; in the remaining 15,
ath was unrelated to peptic ulcer or the opera-
on. More than half the cases were observed
er 10 yr. and none less than 3.5 yr. All but
of 336 patients avoided discomfort after meals
moderate dietary restriction. There were no
ses of recurrent ulceration or ulcer-type
spepsia. When mobilization of the stomach was
stricted to the separation of the fundus from
e spleen, but leaving the gastrophrenic liga-
nt intact, earlier cases of regurgitation fol-
wing meals ceased and no further cases of bile
miting occurred. Of the 336 patients, 313
ssed 1 or 2 formed firm stools per day or were
nstipated, 20 reported loose stools on occa-
on, 3 reported diarrhea. Three patients showed
eatorrhea, 18 gained wt., 89 lost wt., and 229
mained at the same wt. Of the 76 patients
inically considered to be anemic, all responded
therapy. The absence of obstructive sequelae
the cases was taken to support the view that
en they occur a "loop" is the obstructive
gent. It is suggested that a less-extensive
esection of the stomach would produce less dis-
rbance of function with good control or re-
rrent ulceration and diarrhea.

044 D-XYLOSE TEST IN GASTRECTOMIZED PATIENTS.
(Rum.) Strat, C. (2nd Med. Clin., Iasi,
umania), N. Popescu and E. Popescu. Med. Intern.
Bucur.) 18(10):1163-1168, 1966.

ntestinal absorption was investigated in 26
astrectomized patients (Reichel-Polya operation).
ith one exception (post-traumatic rupture of the
tomach), the patients had been suffering from
astroduodenal ulcer. The subjects comprised
6 men (aged 28-58 yr.) and 10 women (36-58 yr.),
tudied 15 mo.-13 yr. after operation. In 12
atients, the degree of postoperative malnutrition (underweight) was mild (-3 kg); in 9, it was moderate (-8 kg); and in one, severe (-17 kg). The control group consisted of 20 healthy subjects (12 men aged 22-48 yr. and 8 women aged 19-45 yr.). The av. urinary pentose excretion (provoked pentosuria) was 5.8 g (range: 4.3-7.9 g). In 58.8%, urinary D-xylose excretion was normal; in 42%, it was reduced. Provoked hypercarotenemia levels were low normal in 49% (28-76 μg, as against 116 μg in controls). In 10 of 11 patients with abnormal D-xylose values, the following clinical symptoms were noted: jejunitis, accelerated intestinal transit, diarrhea, and (in one case) severe steatorrhea. It is concluded that the D-xylose test, in conjunction with other methods of investigation (radiologic, biologic, clinical), is a useful approach in the study of intestinal absorption.

6045 X-RAY FINDINGS AFTER PARTIAL GASTRECTOMY: A SERIAL STUDY IN MAN. (E.) Lehtinen, E. (U. Central Hosp., Turku, Finland) and M. Linna. Radiol. Clin. (Basel) 35(4):239-246, 1966.

Postgastrectomy changes of the gastric stump were evaluated in 16 patients subjected to Billroth II procedures. Roentgenographic assessment of the patient's condition was initiated during the sixth to tenth postoperative wk. with examination thereafter repeated at 3-6 wk. intervals. Radiographic technics employed during this serial study included ordinary plain roentgen films, image-amplification with television monitoring, use of a Philips "single-shot" camera and occasional cineradiography. At 6-10 days postoperatively, the usual picture included dilatation of the residual stump with a markedly edematous and irregular mucosal pattern. Swelling of the stoma was most pronounced at the opening of the efferent loop resulting in considerable impairment to the movement of contrast media, even in supine position. In addition, large quantities of secretions were observed in the gastric stump. Although no peristalsis was noted in the stump postoperatively, normal jejunal peristalsis was observed from the start of surgery. Gross distortion of the stomal region was observed occasionally. Mucosal patterns returned to normal in approx. 6 wk. Deformities at the mouth of the stoma gradually disappeared during this same period thus allowing passage of contrast media, almost always in the afferent loop antiperistaltically. Some filling defects persisted for long periods (9 yr. postoperatively in one patient); however, no functional abnormality was caused. Contrast media eventually passed into the efferent loop.

6046 AMINO ACID COMPOSITION OF THE BLOOD SERUM PROTEINS IN STOMACH CANCER PATIENTS. (Rus.) Savran, V. R. (Med. Inst., Lvov, USSR). Vop. Onkol. 12(10):30-35, 1966.

The amino acid composition of total serum protein of 105 patients suffering from stomach cancer was analyzed by paper chromatography and compared with that of sera of healthy individuals. The sera collected from patients exhibited dysproteinemia (increased proportion of α_1- and α_2-globulins and decreased level of albumins), as revealed by electrophoresis in agar gel. The cysteine and lysine contents of serum proteins of patients were, on the av., lower by 25.4 in 59 of 80 patients and 20.3% in 68 of 80 patients, resp., than those of normal sera, the decrease being more pronounced with increasing severity of the disease. Significant differences were not observed in the content of other amino acids. The decrease of cysteine and lysine content of serum proteins is not specific for stomach cancer as a similar phenomenon was observed also in ulcer patients.

6047 CARCINOMA OF STOMACH: EVALUATION OF INDIVIDUAL AND COMBINED DIAGNOSTIC ACCURACY OF RADIOLOGY, CYTOLOGY AND GASTROPHOTOGRAPHY. (E.) Blendis, L. M. (King's Coll. Hosp., London), J. O. W. Beilby, J. P. Wilson, M. J. Cole and G. D. Hadley. Brit. Med. J. 1(5541):656-659, 1967.

A total of 100 consecutive cases were investigated for cancer of the stomach by radiology (Ba meal), gastrophotography and exfoliative cytology. Of 20 patients with malignancy, a correct diagnosis was afforded by Ba meal in 18, gastrocamera in 18 and exfoliative cytology in 14; of 20 malignancies, 19 were detected by at least 1 of the 3 methods. For 80 with nonmalignant conditions, a correct diagnosis was given by Ba meal in 65, gastrocamera in 52 and exfoliative cytology in 67. The overall accuracy for each of the 3 methods was 83% with Ba meal, 70% with gastrocamera and 81% with exfoliative cytology. The latter method gave the only correct diagnosis in 4 patients with a false suspicion of malignancy. The management of 21 of the 100 patients was definitely affected by the combined technic.

6048 ENVIRONMENT AND HEREDITY FACTORS IN CARCINOMA OF THE STOMACH. (E.) Maddock, C. R. (Caernarvonshire & Anglesey Gen. Hosp., Bangor, N. Wales). Brit. J. Cancer 20(4): 660-669, 1966.

Factors related to the etiology of stomach cancer are reviewed, especially genetic influences in that region of Britain (North Wales) where stomach cancer mortality is the highest. Data obtained from the hospital records of 240 residents of Caernarvonshire and Anglesey who died with a well-founded diagnosis of stomach cancer between 1952-1958 showed no unexpected features with respect to symptomatology, sex distribution and gastric acidity. There was a deficiency of juxtapyloric cancer and an excess of lesser curvature and gastric body carcinomas, compared with findings elsewhere in Britain and Europe. Blood group determinations of 124 stomach carcinoma patients did not reveal the expected increase of blood Group A and deficit of blood Group 0 compared with healthy controls in the 2 counties; the usual association was reversed. The incidence of pernicious anemia in the populations at ris to it was not significantly different in Angles an island of high stomach cancer mortality and in the Isle of Man, an island of av. stomach cancer mortality. The 4 atypical features of gastric carcinoma in Anglesey and Caernarvonshi (unique blood group distribution, unrelated pernicious anemia incidence, unusual distribution site of origin of the tumors within the stomach and the high proportion of elderly cases) all conflicted with principles of hereditary influence in the disease. These peculiarities are probably the result of specific environment and exogenous factors powerful enough to obliterate evidence of the usual genetic factors; such a hypothesis is in accordance with previou findings of a gastric carcinoma-soil relationship in this area.

6049 CHEMOTHERAPY IN CANCER OF THE STOMACH. (E.) Wilken, B. J. (U. Edinburgh, Scotland) and J. W. W. Thomson. Brit. J. Surg. 53(10):904-906, 1966.

A total of 56 patients (27 men, 29 women) with stomach cancer were placed into groups accordin to the initial procedure of treatment carried out: Group 1, laparotomy (biopsy only, tumor irremovable), 33 patients; Group 2, bypass (tumor irremovable), 9 patients; and Group 3, resection (palliative; viable tumor left unresected), 14 patients. Patients were then giv a course of double antimitotic therapy: N-desacetylthiocolchicine (20 mg/day for 5-7 days; i.v.) and methotrexate (2.5 mg twice/day for 5-7 days; p.o.). Thereafter treatment was on an outpatient basis with 20-30 mg of N-desacety thiocolchicine once or twice a wk. and methotrexate, 5 mg/day, reduced after 4-6 wk. to 2.5 mg/day, in most cases. Of 47 patients who had an adequate course of chemotherapy, 31 were in Group 1, 7 in Group 2 and 9 in Group 3. Of 9 who failed to achieve an adequate course, 4 developed severe bone-marrow depression, hemorrhage or infection; 3 others died of their disease or intercurrent infection, but there were no significant toxic effects attributable to the drugs. Of the 47 patients, 25 showed objective improvement (6 of whom had an initial bypass), 3 had subjective improvement, 13 had no effect, 3 were made worse and in 3 results were too early to assess. A total of 15 of 47 were subjected to a second-look procedure (9 in Group 1, 1 in Group 2 and 5 in Group 3); survival time of this group was 3-22 mo. (1 patient is alive and well for 15 mo. at the tim of report). In 5 cases it was possible to resect a tumor which had previously been assessed as irremovable.

6050 GASTRIC DIVERTICULUM. (E.) Meeroff, M. (Gastroent. Serv., Buenos Aires,

entina), J. R. Maciel Gollán and J. C. Meeroff.
r. J. Gastroent. 47(3):189-203, 1967.

clinical and radiological features of gastric
verticulum are described. A total of 30 cases
4%; 19 of the patients were male) of this
ity were encountered out of a total of 7,500
iologic examinations of the stomach. Common
es of occurrence were juxtacardiac in 24 (80%),
tapyloric in 3 (10%), posterior wall in 2
66%) and greater curvature of the stomach in 1
33%). Coexistence of gastric diverticula with
verticula in other sites occurred in 8 cases
.6%); these included colonic diverticula in 3
0%), duodenal diverticula in 3 (10%), esophageal
verticula in 1 (3.3%) and gallbladder diverticula
1 (3.3%). In 50% of the patients the diagnosis
gastric diverticulum was unsuspected on clinical
ounds; in most, an associated lesion was re-
onsible for the symptoms. In one-third of the
tients, gastric diverticula alone were responsi-
e for symptoms: 6 with nonspecific abdominal
in, 3 with flatulent dyspepsia and 1 with hema-
mesis. Of 11 patients in whom duodenal ulcer
existed, 7 had typical ulcer symptoms, 2 had
gue symptoms and 2 were asymptomatic. Three
existed with cholelithiasis, all asymptomatic.
summary, the clinical picture included peptic
cer syndrome in 6, nonspecific abdominal pain
13, flatulent dyspepsia in 6, massive upper
strointestinal hemorrhage in 2 and lack of
mptoms in 3. In 1 case, gastric diverticulum
s first visualized at endoscopy. Medical treat-
nt of gastric diverticulum is preferred to sur-
ry; it consists of a soft diet, antispasmodics
d topical medication (bismuth and belladonna),
stric lavage and postural drainage. Preliminary
diology determines the site of the diverticulum
d the optimum position of the patient to pro-
te its emptying. Surgery is justified 1) when
equate medical treatment has failed and the pa-
ent complains of symptoms that cannot be as-
ibed to any other condition, and 2) when com-
ications have occurred and there is a risk that
ey may recur despite adequate medical treatment.

051 NEGATIVE RESPIRATORY WAVES IN STOMACH.
(E.) Geisel, A. (Michael Reese Hosp.,
hicago, Ill.), T. Arai, A. Doi, N. C. Jefferson
nd H. Necheles. Amer. J. Gastroent. 47(3):204-
08, 1967.

ale and female mongrel dogs starved for 12 hr.
ere anesthetized with pentobarbital. A bundle
f open-tip plastic tubes was passed through the
outh and openings of the tubes positioned in the
sophagus and in various segments of the stomach.
seven-tube unit was used for most studies,
penings were 5 cm apart and were made radiopaque
y inclusion of a small piece of metal. In dogs
ith Komarov esophageal fistulae, introduction of
he tubes was done without anesthesia and record-
ng was done with the dog lying or standing.
ositions of the tubes were checked repeatedly
y fluoroscopy. Each tube was perfused with
water through a T-tube, pressure changes were recorded by appropriate transducers. In 36% of 210 observations negative respiratory pressure waves were recorded in the stomach (150 normal anesthetized dogs and 60 dogs with fistulas). The reversals persisted for 1-10 min. in 26% of the cases noted, 10-60 min. in 37% and 60 or more min. in 37%. In the other 64% of the experiments there was no reversal of positive respiratory excursions in the stomach and during the entire experiment there were negative waves in the esophagus and positive waves in the stomach. Doubt is cast on the acceptability of pressure reversal as a tube passes from the esophagus into the stomach as an indication of the correct position of a tube in the stomach.

6052 INTRAGASTRIC PHOTOGRAPHY: GASTROCAMERA WITH FIBERSCOPE. (E.) Hara, Y. (Niigata Cancer Ctr., Japan), Y. Tobita, H. Tsunoda, K. Sugiyama, M. Arakawa, F. J. Ansfield and J. R. Hoon. Arch. Surg. (Chicago) 94(3):337-343, 1967.

A new device for diagnosis of stomach lesions, the gastrocamera in combination with a fibroscope, is described. This instrument was used on 1,000 patients without mishap. It is of greatest use in those cases where a doubtful gastric situation is presented by a nondiagnostic X-ray film or an equivocal gastrocamera examination. It may be useful in experimental medicine where the gastric phase of medication is of importance. It was successfully used in aged patients, in gravely ill patients and in those with lesions obscured by other diagnostic means. The superiority of a camera within the stomach (the gastrocamera) over instruments which photograph through a fiberscope bundle is emphasized.

6053 INTRINSIC-FACTOR ANTIBODY IN THE SALIVA OF A PATIENT WITH PERNICIOUS ANEMIA. (E.) Carmel, R. (Mt. Sinai Hosp., New York City) and V. Herbert. Lancet 1(7481):80-81, 1967.

Using a complex of ^{57}Co-labeled vitamin B_{12} intrinsic factor and ammonium sulfate precipitation methods, collected saliva samples were assayed for precipitable antibody to intrinsic factor in 3 patients with adult-type pernicious anemia. Demonstration that this antibody was primarily type IgA was indicated in 1 patient by its precipitation with anti-IgA. This same patient had precipitable antibody to intrinsic factor in both her gastric juice (primarily type IgG) and serum as well as a "blocking" antibody in the serum. Precipitable and "blocking" antibody to intrinsic factor were determined in both the gastric juice and serum of a second patient in whom no salivary antibody was found. A third patient showed only precipitable antibody to intrinsic factor only in gastric juice samples, with no "blocking" antibody in evidence from either serum or gastric samples.

The first patient in this series was considered a non-secretor, whereas the last two evaluated were secretors. The question as to whether the precipitable antibody in gastric juice represents, at least in part, an artefact is an open one due to both the addition of pooled normal gastric juice to each unknown sample and the technic of presaturating reagents with non-radioactive vitamin B_{12} both of which favor the artefact hypothesis. Neutralization of intrinsic factor may accelerate the genesis of frank vitamin-B_{12} deficiency in patients with already-reduced intrinsic factor secretion.

6054 GASTRECTOMY VERSUS VAGOTOMY AND DRAINAGE. REVIEW OF 130 GASTRECTOMIES AND 76 VAGOTOMIES. (Heb.) Teva, Z. (Kaplan Hosp., Rehovoth, Israel). Harefuah 72(6):218-222, 1967.

6055 LATE RESULTS FOLLOWING GASTRIC RESECTIONS. (Rus.) Grigorian, A. V. (1st Sechenov Moscow Med. Inst.) and M. D. Lapin. Sovet. Med. 30(2):51-56, 1967.

6056 ELECTROLYTE AND STEROID CHANGES SECONDARY TO GASTRIC RESECTION FOR CANCER. (Rus.) Fedotov, S. D. (Kazan Inst. Postgrad. Med., USSR) and V. E. Volkov. Sovet. Med. 30(2):29-32, 1967.

6057 GASTROSTOMY. A NEGLECTED PROCEDURE. (E.) Weinstein, E. C. (Rancho Los Amigos Hosp., Downey, Calif.). Geriatrics 22(5): 157-161, 1967.

6058 PRELIMINARY TRANSTHORACIC VAGECTOMY. AN AID IN THE MANAGEMENT OF GASTROJEJUNOCOLIC FISTULA. (E.) Rosenberg, I. K. (VA Hosp., Dearborn, Mich.), R. C. Read and E. M. Berkas. Amer. Surg. 33(3):238-240, 1967.

6059 MORBIDITY OF COMPLETE VAGOTOMY. (E.) French, S. W. Amer. Surg. 33(3):171-173, 1967.

6060 CHANGES IN GASTRIC pH IN A GROUP OF PATIENTS WITH BILLROTH II RESECTIONS. (It.) Arullani, P. (U. Rome), R. Carratú, C. Casale and C. C. Cassano. Arch. Ital. Mal. Appar. Dig. 33(2):173-180, 1966.

6061 POSTGASTRECTOMY BILE VOMITING. (E.) Williams, J. A. (Gen. Hosp., Birmingham, England). Pacif. Med. Surg. 75(2):105-107, 1967.

6062 SYNDROME OF RESIDUAL STUMP CYST. (It.) Marsala, F. (U. Bologna, Italy) and G. Francucci. Riv. Gastroent. (Parma) 18(2): 75-86, 1966.

6063 STRUCTURAL CHANGES IN THE MUCOSA OF THE STOMACH AND THE JEJUNUM IN PATIENT
RESECTED ACCORDING TO "BILLROTH II". (Bul.)
Nikolov, N. P. and I. A. Kal'cheva. Vatr. Boles
5(1):85-94, 1966.

6064 BIOPSY STUDIES IN GASTRECTOMIZED PATIENTS. (Ger.) Seifert, E. (Hanusc
Hosp., Vienna). Wien. Z. Inn. Med. 48(2):71-79,
1967.

6065 RADIOTELEMETRIC STUDIES OF THE GASTROINTESTINAL TRACT IN PATIENTS SUBJECTED
TO GASTRECTOMY WITH GASTROCOLOPLASTY. (Rus.) Pomosov, D. V. (Kirov Order of Lenin Med. Acad., Leningrad, USSR) and I. A. Shevchenko. Vestn. Khir. Grekov 98(3):20-23, 1967.

6066 SURGICAL TREATMENT OF PATHOLOGICAL CONDITIONS ASSOCIATED WITH GASTRECTOMY
(Rus.) Sitenko, V. M. (Kirov Order of Lenin Med. Acad., Leningrad, USSR) and V. I. Samokhval
Vestn. Khir. Grekov 98(3):9-15, 1967.

6067 RESULTS OF SURGICAL TREATMENT OF GASTRIC CANCER. (Fr.) Larrieu, H. (Broussais Hosp., Paris), M. Deligny, P. Bouchar
and E. Benassayag. Ann. Chir. 21(3-4):123-126, 1967.

6068 OVERALL RESULTS IN SURGICAL TREATMENT OF GASTRIC CANCER. (CARDIAL NOT INCLUDED). (Fr.) Combemale, B. (Surg. Clin., Lille, France) and M. Vankemmel. Ann. Chir. 21(3-4):127-131, 1967.

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EXCEPTED). (Fr.) Garbay, M. (Broussais Hosp., Paris), M. Deligny and P. Bouchard. Ann. Chir. 21(3-4):132-136, 1967.

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MANAGEMENT OF HEMORRHAGIC GASTRITIS.
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Ingelrans, P. (Child. Surg. Clin., Lille, Fran
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6106 MORPHOLOGICAL CHANGES IN THE STOMACH
IN PORTACAVAL ANASTOMOSIS IN THE DOG.
(Rus.) Rudenskaia, M. V. (Sklifosov Sci. Res.
Inst. Emergency Treatment, Moscow). Eksp. Khi
Anest. 12(2):34-38, 1967.

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Pequignot, H. and J. Guerre. Concour
Med. 89(15):2853-2863, 1967.

See also abstract nos.: 5713,5715,5765,5766,5768,5769,5992

CLINICAL AND PATHOLOGICAL ASPECTS OF
PRIMARY CANCER OF THE SMALL INTESTINE.
) Busch, W. (Kaiser Franz Josef Hosp.,
a, Austria) and E. Wodak. Z. Gastroent.
315-323, 1966.

linical aspects of 832 cases of cancer of
ejunum and ileum, reported in the literature
1824, are reviewed and one case of carcinoma
e ileum under the care of the authors is con-
ed in detail. Of the 832 cases 497 (62%)
in the jejunum and 305 (38%) in the ileum.
precise localization occurred in 268 in-
es, 185 in the jejunum, 23 at the duodeno-
al flexure, 121 in the upper, 25 in the mid-
and 16 in the lower third of the jejunum;
ses were in the ileum, 7 in the upper, 18 in
iddle, and 58 in the lower third. Thus the
lence was greatest in the upper jejunum, next
est in the lower ileum and least in the upper
of the ileum. The overall incidence of
r in the small intestine was quite small; in
than 65,000 autopsies only 16 cancers were
overed. Among 428 cases reported in the
rature 117 patients (53.3%) were in the 40-59
age bracket. Among 647 cases, adenocarcinoma
rred in 603 (93.2%); solid carcinoma in 21
%); scirrhous tumors, 14 (2.2%); gelatinous
inomas, 7 (1.1%); other carcinomas, 2 (0.3%).
intestinal cancers form metastases relatively
in the regional lymph nodes and peritoneum;
ant metastases are seldom seen. The prognosis
arcinoid tumors of the intestine is poor al-
gh long-term healing is reported in the
rature after early resection. The authors
rt in detail a personal case of a solid poly-
hic cell carcinoma about 5 cm thick occurring
he lower ileum 25 cm above the ileocolic
ncter which was not diagnosed until autopsy.

INTESTINAL DECOMPRESSION. (E.)
Tinckler, L. F. Singapore Med. J.
:211-215, 1966.

istorical review of the technic used in
ative decompression of the distended,
ructed intestine is presented, together with
description of a new device designed to im-
e this operation. The device has an 8 mm
eter, a length of 180 cm and is made of trans-
nt vinyl NT/13 shore hardness 80; it possesses
umpet proximal end and bears a plastic bobbin
ts distal end. The tube has a terminal open-
and a lateral port just proximal to the
in. This new device can effectively decom-
s the distended obstructed small intestine
ng operation with minimal trauma to the in-
ine, and it can be left in situ for continued
operative treatment. Decompression of the
l intestine using this tubing is described
detail.

) FUNCTIONAL ASPECTS OF THE SMALL INTES-
TINE IN THE AGED. (It.) Rosa, L.
(U. Bologna, Italy), P. Vannini, L. Gandolfi and
A. Manaresi. Riv. Gastroent. 17(6):385-394, 1965.

The functional state of lipid absorption in the small intestine was studied in 24 aged patients with no clinical or laboratory evidence of digestive tract disturbances, and comparison was made with 15 normal subjects (age 16-35 yr.). Group 1 included 7 patients between the ages of 60-70 yr.; Group 2 included 12 between 71-80; Group 3 included 5 between 81-88 yr. old. Av. values for Groups 1, 2, 3, and controls were as follows: 4.7, 6.1, 9.4, and 3.6 g/24 hr., resp. (oleic acid test); 9.8, 11.4, 15.8, and 8.1% in 3 days, resp. (^{131}I-labeled oleic acid test); 5.9, 9.0, 12.1, and 3.3 g/24 hr., resp. (triolein test); 7.1, 12.6, 14.6, and 7.2% in 3 days, resp. (^{131}I-labeled triolein test); 5.9, 5.7, 4.8, and 6.3 g/urine 5 hr., resp. (xylose load test). Results indicate progressive impairment of intestinal lipid absorption with increasing age, and notable alteration of carbohydrate absorption only in patients over 80 yr. old.

6111 IRON CONTENT OF THE INTESTINAL MUCOSA
AS OBTAINED BY ORAL BIOPSY ACCORDING
TO THE CROSBY METHOD IN HEMOSIDEROSIS AND HEMOCHROMATOSIS. (It.) Astaldi, G. (Tortona Hosp.,
Tortona, Italy), G. Meardi and T. Lisino.
Minerva Gastroent. 12(2):57-58, 1966.

Determination of the Fe content of the intestinal mucosa by the Perls (Prussian blue) test in samples obtained by the Crosby oral biopsy method in 20 healthy subjects (after an 18-hr. fast) revealed no hemosiderin in the epithelial cells of the duodenum or jejunum, nor in the tunica propria of the duodenum. Fe pigment was, however, found in the tunica propria of many of the jejunal villi, especially in the form of granules in the cytoplasm of macrophages localized in the apical region of the villi. In 10 patients with post-transfusional hemosiderosis, no pigment was found in the epithelial cells of the duodenum or jejunum, whereas macrophages containing hemosiderin were present in the tunica propria of both the duodenum and jejunum. In the patient with hemochromatosis, 10% of the villi contained hemosiderin granules in their epithelial lining; 40-50% of the villi contained macrophages with hemosiderin granules in their tunica propria, but these were widely distributed and not limited to the apex. In the patient with hemochromatosis, no macrophages were found crossing the epithelium or beyond it, indicating that their function here regards Fe transport rather than elimination.

6112 INTESTINAL PROTEIN LOSS IN PATIENTS
WITH RHEUMATOID ARTHRITIS. (It.)
Marano, R. (U. Bari, Italy), G. Pastore and O.
Schiraldi. Boll. Soc. Ital. Biol. Sper. 42(14):
871-873, 1966.

Intestinal protein loss was assessed by fecal radioactivity determination in 5 female patients with rheumatoid arthritis 10 days after i.v. inj. of ^{51}Cr-labeled albumin (100 μc). Tests were conducted outside of the period of cortisone treatment. Marked increase in the fecal elimination of ^{51}Cr was observed in 3 of 5 patients, indicating abnormal intestinal protein loss. The authors conclude that amyloid transformation as a cause of protein loss is a rarely observed phenomenon and that the intestinal protein loss observed in these patients is more likely due to diffuse lympho-plasmacellular infiltration of the intestinal mucosa, a condition which can provoke reduced permeability of the intestinal wall to plasma proteins.

6113 β-GALACTOSIDASE ACTIVITY OF THE JEJUNUM AND ILEUM OF SUCKLING RATS. COMPARISON OF ACTIVITIES OF β-GALACTOSIDASE AT DIFFERENT CONCENTRATION OF SUBSTRATES (o-NITROPHENYL-β-D-GALACTOSIDE AND LACTOSE) AT DIFFERENT pH. (E.) Koldovský, O. (Inst. Physiol., Prague), A. Heringová and V. Jirsová. Biol. Neonat. 10(5-6): 241-253, 1966.

The β-galactosidase activity of homogenates of the jejunum, ileum and isolated microvilli fraction of suckling rats (14-days-old) and weanling rats (24-days-old) was studied; lactose and o-nitrophenyl-β-galactoside were used as substrates at different conc. and different pH. Quantitative and qualitative differences disappeared during weaning. It was also shown that the microvilli fraction contains a β-galactosidase activity with a high affinity for lactose; 80% of the total homogenate activity of the jejunum, estimated at pH 6.0 using lactose as a substrate, was found in this fraction.

6114 PATHOGENESIS OF JEJUNAL MUCOSAL ALTERATIONS: SYNECHIA FORMATION. (E.) Schenk, E. A. (U. Rochester Sch. Med., N. Y.), I. M. Samloff and F. A. Klipstein. Amer. J. Path. 50(3):523-531, 1967.

More than 500 jejunal biopsy specimens from 139 patients (celiac disease, 19; tropical sprue, 24; protein malnutrition, 3; anemia, 7; regional enteritis, 5; postgastrectomy, 4; agammaglobulinemia, 3; other gastrointestinal disorders including diarrhea, 69; and normal, 5) were examined. Most biopsy specimens, except those which were flat or convoluted, revealed a mixed pattern; leaf-shaped villi were usually found admixed with normal finger-shaped villi, and villus ridges often occurred in the presence of leaf-shaped villi. All tissues obtained from patients with untreated celiac disease had a flat or almost flat mucosa, while those from patients with tropical sprue had considerable variation in the degree of villus abnormality; 4 had a normal villus pattern, 10 showed villus ridges, 6 were convoluted and 5 were completely flat. Of biopsy samples from patients with diagnoses other than tropical
sprue or celiac disease, 22 were normal, 16 ha
leaf-shaped villi, 47 had ridges, and 9 had a
convoluted pattern. Two specimens were com-
pletely flat; 1 was from a patient with an Fe-
deficiency anemia and 1 from a patient with
protein malnutrition. Specimens that demonstr
a normal villus pattern, ridges, leaves or con
volutions usually were serially sectioned; 2
normal tissues, 7 with a leaf-shaped pattern
13 of those ridged had microscopic evidence o
what was interpreted as villus fusion or syne
formation; this process occurred most often n
tips of the villi, but it was also seen at an
level along the villus wall. Sizes of the sy
iae were variable; some consisted of no more
than 2 or 3 adjacent epithelial cells while o
included a major portion of 2 adjacent villi.
jejunal mucosal abnormalities described most
likely occur as a result of inflammatory adhe
between villi. Complete loss of a villous pa
with a flat mucosa may result from 1) further
adhesions between adjacent ridges, or 2) an i
flammatory cell infiltration and edema within
lamina propria of the villi. These results d
onstrate that villus synechiae are commonly e
countered in jejunal biopsy specimens that sh
minimal other abnormalities.

6115 INFLUENCE OF INTESTINAL CONTENT ON
RADIATION LESIONS OF THE SMALL INTE
(E.) Hiatt, N. (Cedars-Sinai Med. Ctr., Los
Angeles, Calif.) and N. E. Warner. Proc. Soc
Exp. Biol. Med. 124(3):937-939, 1967.

Five dogs were prepared with Thiry-Vella fist
each consisting of a 15-cm segment of mid-jej
2 dogs were irradiated with 1,000 r to the ab
and 3 with 1,500 r. After radiation, only th
epithelial changes were the same in the isola
loop and in the small intestine in continuity
The mucosa in fistulous segments were relativ
well-preserved; in contrast, the rest of the
small intestine had typical changes that foll
exposure to radiation. These included mucosa
erosions with hemorrhage, reduction in overal
mucosal thickness, attenuated or absent villi
an inflamed, congested lamina propria and gre
distention of mucosal glands, with mucus stas
These results suggest that intestinal content
exacerbates radiation injury of the small int
tine, just as it aggravates lesions induced b
a radiomimetic drug. It is suggested that le
ening of the isolated segment and shortening
the intestine in continuity will significantl
improve postirradiation survival.

6116 CHEMOPROPHYLAXIS WITH PENICILLIN.
PREVENTION OF BACTERIAL GANGRENE IN
ISCHEMIC INTESTINE. (E.) Cole, W. R. (4960
Audubon Ave., St. Louis, Mo.), E. D. Maley, P
George and H. R. Bernard. Arch. Surg. (Chica
94(2):182-183, 1967.

The mesenteric artery was ligated in 22 dogs
distal to the first jejunal branch; 11 select

random were given 1 x 10^6 U of penicillin G
500 ml of lactated Ringer's soln. before
erial ligation and another 1 x 10^6 U of peni-
lin G 24 hr. after operation. The same vol.
lactated Ringer's soln. was given to controls
hout adding penicillin. All control dogs died
hin 72 hr. and all showed necrosis of the in-
tine varying from a few cm to total necrosis
the entire segment supplied by the occluded
ery. No necrosis was found in the intestines
animals treated with penicillin, and only 1 of
se animals expired within 72 hr. These results
onstrate the effectiveness of antimicrobial
rapy in the prevention of bacterial gangrene
ischemic intestine in the dog. It is suggested
t chemoprophylaxis should be considered as an
unct to good surgical technic during the per-
mance of surgery on ischemic organs.

7 SMALL-BOWEL EPITHELIAL MIGRATION DURING
A GENERALIZED NONENTERIC INFECTION IN
RAT. (E.) Shambaugh, G. E. (Walter Reed
y Med. Ctr., Fort Detrick, Md.), D. S. MacNair
W. R. Beisel. Amer. J. Dig. Dis. 12(4):403-
, 1967.

ponse of small intestinal epithelial migration
ing a nonenteric infection was investigated in
lt male Dunning-Fischer rats. There was a
sustained increase in crypt mitotic activity
hr. after a s.c. inoculation of Diplococcus
umonia, type I-A5; this was followed by a
ilar nonsustained increase in small intestine
thelial-cell migration 8 hr. afterward. Neither
structure of the villi nor the appearance of
epithelial cells was altered during the in-
tion.

8 FETAL DEVELOPMENT OF NONSPECIFIC
ESTERASES AND ALKALINE PHOSPHATASES
IVITIES IN THE SMALL INTESTINE OF MAN. (E.)
ichová, H. (Charles U., Prague), O. Koldovský,
Uher, J. Kraml, A. Heringová and V. Jirsová.
l. Neonat. 10(5-6):281-287, 1966.

activity of the soluble nonspecific esterase
bstrate β-naphthyl acetate) in the proximal
distal third of the human small intestine did
change between 7 and 22 wk. after conception;
ivity was always higher in the ileum. Electro-
resis revealed the presence of 1 anodic and 2
hodic fractions, both of which moved together
h the "slow moving gamma globulins". Soluble
aline phosphatase activity increased steadily
the jejunum; in the ileum an increase was first
erved between 7 and 11 wk. after conception,
later such activity decreased. No proximo-
tal difference was found in the age group of
-10.5 fetal wk.; in a single 22-wk.-old fetus,
re was relatively low alkaline phosphatase
ivity in the ileum and high activity in the
unum. In older fetuses (11-18 wk.-old), ileal
ivity was several times higher than in the
nger age group and also significantly higher
an in the jejunum.

6119 THE PATHOLOGY OF PROLIFERATIVE ILEITIS OF THE GOLDEN SYRIAN HAMSTER. (E.) Boothe, A. D. (Nat. Animal Dis. Lab., Ames, Iowa) and N. F. Cheville. Path. Vet. (Basel) 4(1):31-44, 1967.

Lesions of an acute and chronic ileitis were studied in golden Syrian hamsters (92 animals; 6-12 wk. old). Morbidity and mortality rates were 25-60% and 90%, resp. The initial lesion was epithelial hyperplasia of the ileal mucosa; severe inflammatory changes in the ileum and adjacent structures were secondary. No etiologic agent was isolated, and the disease was not neoplastic. Proteus and Pseudomonas spp., usually together, were the organisms found most frequently in the intestine; Escherichia coli or Aerobacter aerogenes were rarely isolated, but when present, they were not from the same animals from which Proteus or Pseudomonas spp. were isolated. No Salmonella spp. were isolated. E. coli was occasionally demonstrated in heart blood. Inoculation p.o. with E. coli produced a watery diarrhea and enteritis, but not lesions of proliferative ileitis. Animals inoculated with intestinal contents or macerated ileal wall did not develop ileitis. Approx. 10% of fecal flotation preparations contained eggs of Ascaris spp. and of Hymenolepis nana, or both. No coccidia were found.

6120 CLINICAL STUDY OF INTESTINAL OBSTRUCTION. (Ger.)(Rev.) Reifferscheid, M. (Med. Fac., Tech. Inst., Aachen, Germany). Internist (Berlin) 8(4):125-131, 1967.

6121 DUODENAL OCCLUSION IN THE NEWBORN. (It.) Schiavetti, E. (Child. Hosp., Milan, Italy) and A. Fiocchi. Nunt. Radiol. 32(7):593-637, 1966.

6122 POSTOPERATIVE INTESTINAL OBSTRUCTION IN CHILDREN. (E.) Raffensperger, J. G. (Cook County Hosp., Chicago, Ill.) and R. J. Baker. Arch. Surg. (Chicago) 94(4):450-459, 1967.

6123 INTESTINAL OBSTRUCTION IN THE NEWBORN. REVIEW OF 50 CASES. (E.) Long, L. (U. Oklahoma Sch. Med., Oklahoma City). Arch. Surg. (Chicago) 94(4):443-449, 1967.

6124 42 EARLY POSTOPERATIVE OCCLUSIONS IN ABDOMINAL SURGERY. (Fr.) Lagache, G. (City Hosp., Lille, France), C. Proye, M. Vankemmel and F. Leplat. Lille Chir. 21(6):341-345, 1966.

6125 EARLY ILEUS AFTER APPENDECTOMY. (Pol.) Stajgis, P. (2nd Surg. Clin., Poznan, Poland). Wiad. Lek. 20(6):531-536, 1967.

6126 PRIMARY EPITHELIOMAS OF THE DUODENUM (11 PERSONAL OBSERVATIONS). (Fr.) Levrat, R., G. Lambert and M. Girard. J. Med. Lyon. 48(1117):427-482, 1967.

6127 PRIMARY MALIGNANT TUMORS OF THE SMALL INTESTINE. (Ger.) Künzli, H. F. (U. Clin. Basel, Switzerland). Praxis 56(16): 547-552, 1967.

6128 SOLITARY ULCER OF THE SMALL INTESTINE (TWO CASES). (It.) Morganti, I. (U. Bologna, Italy) and A. Platania. Ateneo Parmense 36(6):611-624, 1965.

6129 PROSTHESES FOR ILEOSTOMIES. (E.)(Rev.) Orowan, E. (Massachusetts Inst. Techn., Boston). New Eng. J. Med. 276(10):571-574, 1967.

6130 DUODENAL ATRESIA AND MATERNAL HYDRAMNIOS. (E.) Barr, L. W. and H. B. Neel. Minn. Med. 50(4):491-495, 1967.

6131 POSTOPERATIVE INTUSSUSCEPTION IN INFANTS AND CHILDREN. (E.) Stevenson, E. O. S. (Child. Hosp. Los Angeles, Calif.), D. M. Hays and W. H. Snyder, Jr. Amer. J. Surg. 113(4): 562-566, 1967.

6132 OCCLUSION DUE TO THE ANOMALY OF ROTATION OF THE PRIMITIVE INTESTINE ASSOCIATED WITH VOLVULUS IN THE NEWBORN. (It.) Vichi, G. F. (U. Florence, Italy). Nunt. Radiol. 32(7):563-592, 1966.

6133 SPONTANEOUS ASYMPTOMATIC PNEUMOPERITONEUM. A COMPLICATION OF JEJUNAL DIVERTICULOSIS. (E.) Herrington, J. L. (Vanderbilt U. Sch. Med., Nashville, Tenn.). Amer. J. Surg. 113(4):567-570, 1967.

6134 DUODENAL DIVERTICULA AND SPECIFICITY OF THEIR ROENTGENOLOGICAL DIAGNOSIS IN PATIENTS WITH CHRONIC GASTRITIS. (Rus.) Pishchin, E. M. (Novosibirsk City Clin. Hosp. No. 12, USSR). Sovet. Med. 30(2):102-105, 1967.

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6136 CLINICAL STUDY AND SURGERY OF DUODEN
DIVERTICULA, ESPECIALLY OF INTRAPANCREATIC LOCALIZATION. (Ger.) Köle, W. (Regic
Hosp., Graz, Austria) and V. Müller. Zbl. Chi
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6137 THE TREATMENT OF ACUTE INTESTINAL
RADIATION REACTIONS IN TELECOBALT AN
RADIUM IRRADIATIONS. (Ger.) Neumeister, K.
(Karl Marx U., Leipzig, Germany), J. Pfeiffer
and J. Zaméčnik. Radiobiol. Radiother. 7(5):
565-568, 1966.

6138 HISTOPATHOLOGIC CHANGES OF THE MUCOS
OF THE SMALL INTESTINE IN SOME PARASITIC DISEASES OF THE ALIMENTARY TRACT. (Pol
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Rochelle, N. Y.). Amer. J. Med. Sci. 253(3):
263-271, 1967.

6140 PIG-BEL--EPIDEMIC AND SPORADIC NECRO
ING ENTERITIS IN THE HIGHLANDS OF NE
GUINEA. (E.) Murrell, T. G. C. (U. Adelaide
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6141 HYPOTONIC DUODENOGRAPHY (DIAGNOSTIC VALUE AND INDICATIONS). (Bul.) Kolarski, V. and V. Grupchev. Vatr. Bolesti
5(1):57-66, 1966.

6142 FOREIGN BODY PERFORATION OF MECKEL'S DIVERTICULUM. (E.) Gregorie, H. B.
Jr. (Roper Hosp., S. C.) and K. H. Herbert. Amer. Surg. 33(3):231-233, 1967.

6143 THE TREATMENT OF INTESTINAL FISTULAS
(Rus.) Borisov, A. I. (Karaganda Me
Inst., USSR). Vestn. Khir. Grekov 98(1):77-7
1967.

6144 DIAGNOSIS AND INDICATIONS FOR SURGER
OF ADHESIVE INTESTINAL OBSTRUCTION. (Rus.) Gorfinkel, I. V. (Saratov Med. Inst., USSR). Vestn. Khir. Grekov 98(2):33-37, 1967

See also abstract nos.: 5629,5636,5659,5660,5672,5759,5767,5779,5794,5797,5891

5   SPONTANEOUS PEPTIC ULCERS IN MICE.
(E.) Williams, A. W. (U. Otago,
edin, New Zealand), J. B. Howei, B. J. Helyer
L. O. Simpson. Aust. J. Exp. Biol. Med. Sci.
1):105-108, 1967.

ups of NZB mice, totaling 1039 in all, were
mined after death at various ages. This
ain was previously reported to have a moderate
idence of chronic peptic ulcers. The mice
e killed by ether, the stomach contents taken
pH measurements, and the stomach and duodenum
ed. After fixation was complete the mucosa
inspected for lesions. Approx. 130 males
143 females were "terminally killed" because
y were very sick; the rest were killed in
onological sequence. In healthy mice peptic
ers first appeared between 2 and 4 mo. of
, the incidence rose to a max. of 80% be-
en 24 and 26 mo. In terminally killed mice
incidence rose more steeply reaching 100%
the 26th mo. The majority of ulcers were
uated at or immediately distal to the pyloric
g, although occasional ulcers occurred in the
mach. The lesions were usually oval or round
ging from 1-2 mm in diameter. Most ulcers
wed replacement of the full thickness of the
ceral wall by fibrovascular or fibrous
nective tissue, infiltrated by lymphocytes
plasma cells, as well as polymorphonuclear
kocytes and histiocytes. Mucosal plaques in
duodenum were common. Plaques occurred
lier than ulcers and reached a max. of 75% at
11 mo. and dropped to 20% by the 26th mo.
re was no correlation between ulcers and
tric juice pH, or any of the blood tests.
etiology and pathogenesis of the ulcers is
yet uncertain.

6   RIBOFLAVIN DEFICIENCY AND GASTRIC
ULCER PRODUCTION IN THE RAT: A
CEDURE FOR THE STUDY OF SUSCEPTIBILITY TO
ESS-INDUCED GASTRIC ULCERS. (E.) Kim, Y. S.
Nebraska Coll. Med., Omaha) and J. P.
booy. J. Nutr. 91(2):183-188, 1967.

nling female Wistar rats were maintained
er standard conditions and fed a diet
icient in riboflavin. All rats used were
st made deficient; those used as normals
e fed a riboflavin-supplemented diet. After
dying several combinations a stress of a
r. period of rocking (cage rocked 160
les/min., excursion 2.5 cm) on each of 5
cessive days was selected as a stress. This
cedure was earlier found to produce multiple
ers in the glandular portion of the stomach
all deficient rats tested. Rats fed a
plemented diet for 12 days showed no ulcers
er 6 days of the rocking procedure. Two
mal studies were carried out, ad libitum
eding and paired feeding. In the ad libitum
rats all of the deficient animals showed
cers after 5 days of the stress procedure.
None of the rats fed the supplemented diet had ulcers. In the second study 3 rats in the deficient group and 2 in the supplemented group died. In the deficient group 14 of 15 rats showed extensive ulceration. In the control group 2 of 15 were found to have small lesions. The lesions seen were described by pathologists as typical ulcers, similar to small unperforated gastric ulcers in humans.

6147   THE IMPORTANCE OF THE "NEUROGENIC" FACTOR IN THE GENESIS OF THE SHAY GASTRIC ULCER. (It.) Loscalzo, B. (U. Naples, Italy) and F. Di Mezza. Minerva Med. 57(75): 3028-3032, 1966.

Gastric ulcers were induced by the Shay method in 65 rats of both sexes (av. wt. 233.2 g) fasted for 36 hr. but fed water ad libitum before surgical treatment. Group 1 (39 rats) received 1 ml/100 g of a 10% gum arabic soln. i.p. after surgery; Group 2 (26 rats) received an i.p. inj. of meprobamate-barbiturate after the 10% gum arabic. The ulcers which developed in animals of Group 1 were more frequent and more lethal than those in rats of Group 2. The av. mortality was 28.2% in Group 1 as compared to 0% in Group 2; the av. ulcer index was 38.9 in animals of Group 1 as compared to 12.57 in animals of Group 2. Results indicate that a neurogenic factor plays an important part in the mechanism of development of Shay ulcers as shown by the partial protection afforded by the admin. of CNS depressant drugs.

6148   GASTRIC ULCERS IN SWINE. I. EFFECT OF DIETARY PROTEIN, DIETARY FAT AND VITAMIN E ON ULCER DEVELOPMENT. (E.) Nafstad, I. (Vet. Coll., Oslo, Norway). Path. Vet. (Basel) 4(1):1-14, 1967.

The effects of different protein and fat levels, and the supplement of vitamins B_1 and E and the amino acids lysine, methionine and tryptophan on development of gastric ulcers in pigs were studied in 3 experiments involving 72 pigs. Addition of vitamin B_1, amino acids and the feeding of low fat rations did not change the number of stomach lesions observed, but a modifying effect of vitamin E on ulcer development was noted. Feeding of low protein diets resulted in no increase in the total number of stomach lesions, but appeared to increase their severity.

6149   GASTRIC ULCERS IN SWINE. II. EFFECTS OF HIGH FAT DIETS AND VITAMIN E ON ULCER DEVELOPMENT. (E.) Nafstad, I. (Vet. Coll., Oslo, Norway) and S. Tollersrud. Path. Vet. (Basel) 4(1):15-22, 1967.

Feeding pigs diets with large amounts of unsaturated fatty acids either in fresh or oxidized condition was strongly ulcerogenic. The addition of amino acids or Se to the diet, or an increase of dietary protein did not change the number of lesions. Vitamin E had a slight, but not significant, degree of protection against gastric lesions. An increased severity of the lesions when vitamin E was omitted from the ulcerogenic diet was more obvious. A serious vitamin E deficiency might cause a physiologic lack of vitamin A, which may have been related to gastric ulceration, but it has been shown that addition of high levels of vitamin A to swine rations does not prevent ulceration; therefore a possible action of the tocopherols (vitamin E) in ulcerogenesis cannot be sought in their interrelation with vitamin A. The mode of action of vitamin E in preventing gastric lesions is discussed.

6150 GASTRIC ULCERS IN SWINE. III. EFFECTS OF DIFFERENT PROTEINS AND FATS ON THEIR DEVELOPMENT. (E.) Nafstad, I. (Vet. Coll., Oslo, Norway), S. Tollersrud and B. Baustad. Path. Vet. (Basel) 4(1):23-30, 1967.

A report is presented in which the effects of saturated dietary fats and different sources of protein on gastric ulcers in pigs is described. Diets were tested in which hydrogenated coconut oil and soybean meal replaced cod-liver oil and casein of a previous ulcerogenic diet. Feeding of saturated instead of unsaturated dietary fats caused a reduction in the severity of gastric lesions. No ulcers, but some epithelial changes, occurred in the stomachs when casein was partially replaced with soybean meal, or by using the latter as the only source of protein (at a level of 27%). However, all pigs on a ration containing 36% soybean meal had normal stomachs. These results are compared with results from other studies.

6151 PRODUCTION OF DUODENAL ULCERS BY EXOGENOUS GASTRIN. AN EXPERIMENTAL MODEL. (E.) Gobbel, W. G., Jr. (VA Hosp., Nashville, Tenn.) and R. B. Adkins. Amer. J. Surg. 113(2):183-187, 1967.

Gastrin was extracted from hog antral mucosa using Gillespie and Grossman's method. To obtain a sustained release of gastrin the extracted material was lyophilized and incorporated into an aqueous gelatin suspension. A similar histamine-free fundic mucosa extract was prepared as a control. S.c. inj. of the gastrin-gel mixture into Heidenhain pouch dogs increased pouch acid up to 24 hr. compared to an 9 hr. effect of aqueous soln. Of 35 guinea pigs receiving gastrin in 16% gelatin (gastrin dose equal to 35 g of hog antral mucosa/kg) every 12 hr. for 14 days duodenal ulcer developed in 26 animals within 14 days. All ulcers were duodenal and developed within 1 cm of the gastroduodenal junction. Of the 26 animals in which ulcers developed, perforation with peritonitis and death developed in 24. A bleeding ulcer developed in one animal and a deep penetrating ulcer developed in one animal Guinea pigs receiving 16% gelatin only, aqueou gastrin only, or an extract of hog gastric fundic mucosa failed to develop ulcers. The method is considered to offer a new technic fo the experimental production of duodenal ulcers

6152 COMPARATIVE EFFECTS OF ATROPINE AND OCTYLATROPINIUM ON RESTRAINT ULCERS IN RATS AND ALBINO MICE. (Fr.) Mercier, J. (Fac. Med. Pharm., Marseille, France) and S. Lumbroso. Therapie 21(6):1537-1542, 1966.

In rats undergoing 24 hr. of restraint and mic restrained for 7 hr. after a 24-hr. fast (both at 20°C), the ulcer incidence was 70% an 75%, resp. Rats were treated with parasympath colytic agents in 2 doses (at the beginning of restraint and 12 hr. later); mice received 1 dose at the beginning of restraint. In rats, atropine sulfate or atropine octobromide (10-40 mg/kg) caused dose-dependent protection against stress ulcer (30-100%); in mice, atrop conferred 35% and 55% protection at 2 and 4 mg/kg, resp., but had no effect at 1 mg/kg. I both rats and mice, N-octylatropinium Br was 5-6 times less active (50% protection at eithe 20 or 24 mg/kg in mice; 10% or 50% protection at 80 or 120 mg/kg, resp., in rats). Carbacho induced gastric hypersecretion was inhibited by atropine better than N-octylatropinium, the difference being a factor of 7.5. It is concluded that the anti-ulcer effects of N-octylatropinium Br result from inhibition of gastric secretion.

6153 EFFECT OF ENVIRONMENTAL TEMPERATURE ON THE PRODUCTION OF RESTRAINT ULCEF IN THE RAT. (Fr.) Buchel, L. (Inst. Pharmacc Fac. Med., Paris) and D. Gallaire. C. R. Soc. Biol. (Paris) 160(10):1817-1820, 1966.

In fasting (24 hr.) rats restrained for 2.5 h at environmental temperatures of 24-38°C, the max. ulcer incidence was 35%. The frequency and severity of the ulcers increased as the environmental temperature was reduced (incide 95% at 14°C). After 1.5 hr. of restraint, the ulcer incidence was also temperature-dependen (from 15% at 32°C to 75% at 14°C). Unrestrai rats did not develop ulcers. In non-fasting rats, the ulcer incidence was also temperature dependent, but the frequency was lower at comparable temperatures (at 14° and 1.5 and 2. hr. of restraint, 45% and 62%, resp.). The CNS-mediated decrease in body temperature during restraint was important but not the only factor in ulcer production. In fasting rats undergoing 1.5 hr. of restraint at 14°C, the ulcer incidence in controls was 60% and body temperature fell 3.2°C. Nonhypnotic doses of phenobarbital (100 mg/kg) and hypnotic doses chloral hydrate (300 mg/kg) exaggerated the f rectal temperature (decreases of 5.5 and 9.3°C, sp.) but also reduced the ulcer incidence 5% and 30%, resp.).

54 GASTRIC HISTIDINE DECARBOXYLASE LEVELS AND EXPERIMENTAL ULCERS IN THE RAT.

r.) Schwartz, J. C. (Fac. Pharm., Paris), Y. hen and G. Valette. Biochem. Pharmacol. (12):2122-2124, 1966.

rats treated with ulcerogenic doses of enylbutazone (100 mg/kg; ulcer incidence 9 of) or serotonin (8 mg/kg; incidence 8 of 10) ter a 24-hr. fast, or undergoing restraint for hr. after a 14-hr. fast (incidence 12 of 13), omach histidine decarboxylase levels 4 hr. ter treatment (in mμM/3 hr.) were 1.72, 1.33 d 2.06, resp., a significant increase from ntrol values (0.79). Ulcerogenic doses of serpine (8 mg/kg; incidence 7 of 7), however, d not increase histidine decarboxylase tivity. Phenylbutazone did not induce ulcers stimulate this enzyme in rats fed ad libitum.

55 PHARMACODYNAMIC AND CLINICAL STUDIES OF A NEW ANTISEROTONIN, 8599 RP, IN IE TREATMENT OF DUODENAL ULCER.

(Fr.) Bereni, Gaz. Hop. (Paris) 139(6):259-264, 1967.

animal experiments, 3-(dimethylamino-2'-opyl)-10-phenothiazine dimethyl sulfamide, in ne methanesulfonate form (8599 RP; Migristene; -20-mg capsules, 50-mg suppositories or 10-mg lixir) was 3 times more powerful than pro-ethazine as a serotonin antagonist, with equal superior antihistamine activity; its anti-erotonin activity was 2 times less than that of ethysergide. Significant protection against lcers was noted in guinea pigs treated with istamine and the Shay serotonin ulcer in rats. n 30 patients with duodenal ulcer (23) or with astritis, duodenitis or gastroduodenitis (7), igristene elixir (60 mg in 2 days; 3 patients) r suppositories (27 patients) suppressed gastric ecretion in 10 of 11 patients with hyper-hlorhydria (the single exception had pyloric tenosis with an ulcer); it had no effect in 4 atients with hypochlorhydria and gave variable esults in patients with normochlorhydria. The esponses were independent of the presence or bsence of ulcers. The elixir (30 mg/day for 20 ays) was admin. to 23 patients with recent (5) r established (18) duodenal ulcers (2 with yloric stenosis, 2 with histories of perforation). ood-to-excellent responses (pain relief within -10 days, usually within 3 days) were seen in 7 patients, including all cases of established lcer without stenosis. Moderate responses were oted in 3 patients, all with recent ulcers. ne patient with an acute ulcer of recent origin nd the 2 patients with pyloric stenosis failed o respond; the 2 latter patients underwent urgery within a short time. No other treatment as given during this period. No side effects ere noted at this dose level.

6156 ULCERS WITH BOTH GASTRIC AND DUODENAL LOCATIONS. ANATOMO-CLINICAL AND THERAPEUTIC STUDY OF 15 PERSONAL CASES.

(Fr.) Edelmann, G. (Coll. Med., Paris Hosp., France) and J. Brénot. Arch. Franc. Mal. Appar. Dig. 55(11):1015-1032, 1966.

Double ulceration was noted in 6% (15) of 236 patients undergoing surgery. The duodenal ulcer preceded the gastric ulcer (sometimes by several yr., even by over 10 yr.) in 14 cases. The gastric ulcers were found in the lesser curvature in all 15 patients and multiple gastric ulcers were noted in 2 patients. All duodenal ulcers were single and of bulbar location, but their evolution was almost always much less severe than that of the gastric ulcers; in fact, 13 of them were completely healed. Pyloric stenosis by scar tissue was noted in 8 patients; in 7 cases it resulted from the duodenal ulcer. Acute hemorrhage was present in 3 patients; 2 patients had histories of perforation. Malignant degeneration of the gastric ulcer was noted in 1 patient (mucinous adenocarcinoma). Double gastric and duodenal ulceration could not be diagnosed on the basis of secretion tests; the possibility that the gastric ulcer was a secondary trophic lesion arising from static gastritis was considered but no conclusions could be drawn. The authors believe that conservative treatment is of doubtful value in this syndrome; 14 of their patients underwent subtotal gastrectomy (removing both ulcer sites simultaneously) with good results.

6157 ANTRUM-PYLORUS MALFUNCTIONS IN ULCERS OF DUODENUM AND STOMACH.

(Ger.) Hegglin, J., A. Sumser and M. Allgöwer. Gastroenterologia (Basel) 106(3):180-192, 1966.

The so-called benign pyloric hypertrophy of the adult may in fact be the result of a dysfunction of the canalis egestorius, i.e., the distal antrum and pylorus; with stasis of these regions a gastric or duodenal ulcer is to be expected; if the stasis is overcome by the force of contractions from above, a gastric ulcer can be anticipated; if, however, hyperacidity is marked, a duodenal ulcer develops. Typical signs of these events are: (1) Pylorus hypertrophy in the X-ray plates, increased length and stenosis of the pyloric canal with extensions of stenosis into the antrum, depression of the base of the bulbus, changes in peristalsis, and gastric retention without apparent cause such as carcinoma, polyps, or compression by external tumors. (2) Gross examination at operation: thickening of the wall of the distal antrum and the pylorus; narrowing of the canal; peristalsis ceases upon mechanical stimulation. (3) The gastric content after a 12-hr. fast is increased by more than 40 ml. Corroboration was secured by biopsy from the anterior wall of the distal antrum and the pylorus in 56 cases. The histology revealed: (1) Thickening of pyloric smooth muscle only. The circular muscle of the pylorus was 4 times the thickness of the longitudinal muscle caused by both hypertrophy and hyperplasia; or, (2) Fibromuscular changes occurred in pylorus and antrum with the circular muscle surrounded and infiltrated as well as invasion of the submucosa by fibrous connective tissue; or, (3) Fibrous connective tissue invasion without any change in number or size of muscle fibers in the circular or longitudinal layers. The histology of the antropyloric regions of the stomach in 16 subjects with normal digestive tracts was studied as control material; these subjects were young adults who died by accident. The antrum-pylorus biopsies among 22 patients operated upon for gastric ulcer showed 10 to have muscular involvement only and 12 a fibromuscular change. Among 23 patients with duodenal ulcer, 1 had a muscular change only, 10 had fibromuscular change, 9 submucosal fibrosis only and 3 showed no pathological conditions in these regions. All gastric ulcers were marked by muscular or fibromuscular hypertrophy, but submucosal fibrosis was absent. In 19 of 23 cases, duodenal ulcers showed submucosal fibrosis. Controls were all negative for muscular changes and only occasional evidence of fibrosis was observed.

6158 PHYSIOPATHOLOGICAL ASPECTS OF THE ADRENAL CORTEX IN GASTRIC AND DUODENAL ULCER DISEASE. (Rum.) Savulescu, V. (Med. Clin., Adult Hosp., "Tudor Vladimirescu" Region, Rumania), I. Andronache, I. Stefan, A. Gancevici, S. Stancescu, S. Tincu, E. Iliescu and P. Teodorescu. Med. Intern. (Bucur.) 18(10): 1189-1197, 1966.

During the past 2 yr., adrenocortical function was investigated in 86 patients, 15 with gastric, and 71 with duodenal, ulcer. The age of those with gastric ulcer ranged from 20-65 yr. (av. 39 yr.), with a duration of the disease ranging from a few mo. to 16 yr. (av. 2 yr., 4 mo.) and a final, acute period of 3-4 wk. Those with duodenal ulcer ranged in age from 20-60 yr. (av. 35 yr.), with illness for 1 mo.-17 yr. (av. 4 yr., 6 mo.), and acute symptoms for 7 days to 4 mo. (av. 6 wk.). The diagnosis was based on the clinical, radiologic, and gastric secretion findings (tested with alcohol, insulin, and histamine-loading). Androgenic steroid production was tested by determining 24-hr. urinary 17-ketosteroid excretion in basal conditions and after stimulation with ACTH and with insulin. Androgen function varied under all 3 conditions: in a small number of patients (15%), it was normal; in a large number (esp. in patients with duodenal ulcer), it was enhanced (in 38%); and in the majority (47%), and especially in those with gastric ulcer, it was reduced. ACTH stimulation caused marked eosinopenia in 92%, and insulin stimulation did so in 100%. These reactions indicate adrenal hyperactivity (of central, hypothalamo-pituitary origin) in active gastroduodenal ulcer disease; in the quiescent phase, this tendency tends to decline or disappear.

6159 NOCTURNAL SECRETION STUDIES IN DUODENAL ULCER. (E.) Raghavan, P. (Seth G. S. Med. Coll., Bombay), V. N. Acharya and B. D. Pimparkar. Indian J. Med. Res. 55(2): 109-118, 1967.

Nocturnal gastric secretion, obtained by continuous aspiration for a period of 8 hr. between 10 P.M. and 6 A.M., was studied in 130 cases of radiologically-proven duodenal ulcers. The av. secretory vol. was 366.8 ml (range, 100-1030 ml), the mean total acidity (titrated to pH 7.4) was 31.8±28.0 mEq/liter and the av. pH was 2.07. An augmented histamine test was also performed 2-3 days before studying nocturnal gastric secretion. Study of nocturnal secretion before and after vagotomy showed a consistent decrease in vol. and acidity after the operation. There was no significant correlation between nocturnal secretion and age, height, body wt., hemoglobin and serum proteins. A significant correlation was obtained between basal and nocturnal secretion and between max. histamine response and nocturnal secretion. It was found that basal secretion provides as much information as the 8-hr. nocturnal secretion in cases of duodenal ulcer. The high basal secretion in these duodenal ulcer subjects and the significant correlation between the nocturnal and basal secretion may indicate the influence of vagal overactivity in the production of hypersecretion in these subjects.

6160 POSSIBILITIES OF USING THE MAXIMAL HISTAMINE SECRETION TEST IN PATIENTS WITH DUODENAL ULCER. (It.) De La Pierre, M. (U. Turin, Italy), S. Gabasio and G. Bruno. Minerva Med. 57(73):2940-2945, 1966.

In 54 male patients (av. age 43 yr.) with clinically and radiologically confirmed duodenal ulcer who were subjected to the Kay test of max. histamine secretion, both basal as well as histamine-stimulated HCl secretion were significantly increased (6.82 mEq/hr. and 31.48 mEq/hr at 1 hr., resp.) with respect to controls. Gastric secretion levels after histamine were higher than the av. (controls) + 1 sigma in 36 of 54 (67%) patients and higher than the av. (controls) + 2 sigma in 24 of 54 (44%) patients. Basal gastric secretion decreased with age, while histamine-induced secretion was lower in patients under 30 yr. old than in those over 50. Marked individual variability in gastric secretion levels was observed both before and after the test. Results indicate that the Kay test has little diagnostic value in patients whose HCl secretion vol. is less than 39.9 mEq/hr. On the other hand, the test is of value in preoperative studies, inasmuch as the choice between gastric resection and vagotomy can depend upon the patient's gastric secretion levels before and after the test.

161 CHRONIC PULMONARY EMPHYSEMA AND GASTRO-DUODENAL ULCER. (It.) Salonna, L.
J. Bari, Italy), A. Racanelli and R. Bassi.
rogr. Med. (Napoli) 22(15):583-589, 1966.

adiological studies of the stomach and uodenum were conducted in 60 patients (56 men nd 4 women; age 20-76 years) with chronic ulmonary emphysema (47 compensated and 13 right ecompensated). All patients complained of yspeptic disturbances and in most cases chronic ypertrophic gastritis with frequent duodenitis ere observed radiologically. In 17 of 60 atients (30%), gastric (8 patients) or duodenal 9) ulcers were present. Autopsy revealed lcerative lesions in 4 patients. Four patients ad been subjected to resection for previous astric ulcer. Of the 17 patients with ulcers, 0 were compensated and 7 right decompensated; ll had third-degree respiratory insufficiency. f 17 patients with 5,000,000 or more RBC, 8 48%) had gastric or duodenal ulcers and 9 had ypertrophic gastritis or gastroduodenitis. he importance of high RBC, smoking, and hyper-erotoninemia as causal factors are discussed.

162 TREATMENT OF PEPTIC ULCER BY HIGH DOSAGE OF PROPANTHELINE BROMIDE. (E.)
oberts, D. M. (British Milit. Hosp., Munster, lest Germany). Amer. J. Gastroent. 47(2):
24-133, 1967.

f 60 patients (17-46 yr. old) with peptic ulcer, had ulcers which were pyloric and 58 which ere duodenal in origin. These were divided nto 2 groups: Group 1, 29 patients who were reated with as much as 360 mg/day of ropantheline bromide, and Group 2, 31 (controls) atients treated by standard methods. There as no significant difference in either the ymptomatic or radiological response between the groups, and there was a surprising lack of correlation between the radiological and symptomatic response. Side-effects developed in 3 of 29 patients treated with high dosage of propantheline bromide; these included xerostomia (21), cycloplegia (12), epistaxis (5), constipation (4) and hesitancy of micturition (1). It is concluded that propantheline bromide is no better than conventional methods in treating peptic ulcer, and that the concept of "sustained gastric inactivity" introduced by Barowsky et al. is of no value as a method of treating duodenal ulcers in young men.

6163 FOUR CHOLERIFORM SYNDROMES AFTER 550 VAGOTOMIES. (Fr.) Picard, J. M.
(Cent. Reg. Hosp., Nancy, France), A. Larcan, M.
Calamai and E. Polo. Anesth. Analg. (Paris)
23(4):847-856, 1966.

Four patients with duodenal ulcers complicated by perforation (2) or pyloric stenosis (2) and poor nutritional status developed choleriform syndromes due to staphylococci 2-6 days after vagotomy with gastroenterostomy. Broad-spectrum antibiotics were admin. to these patients immediately after surgery (penicillin + Terramycin in 1 case; unspecified in 3 cases). The syndrome was attributed to an upset of the microbial balance in favor of resistant staphylococci and intestinal stasis secondary to vagotomy. Electrolyte imbalance was treated by replacement therapy; at least 2 patients were also treated with antibiotics (erythromycin + spiramycin, or staphylomycin + pyostacin) on the basis of in vitro sensitivity tests. One patient failed to respond and died within about 1 wk.; the other 3 patients responded promptly, although diarrhea persisted for over 2 wk. in 1 case and a subphrenic abscess later developed in another patient.

6164 VAGOTOMY IN THE TREATMENT OF POST-ANASTOMOTIC PEPTIC ULCER. (CASE STUDY). (It.) Ferrara, L. (U. Turin, Italy) and A. Gaetini. Minerva Gastroent. 12(2):
59-63, 1966.

From 1948-65 vagotomy was performed only 20 times among 1,000 patients subjected to gastric resection for gastroduodenal ulcer. Results with resection and gastroenterostomy alone had been very good, and vagotomy was limited to patients with recurrent ulcer and those with simple stomitis. In 12 patients, vagotomy alone (9 supra- and 3 subdiaphragmatic) was performed; results were excellent in 7 (58%), good in 2 (17%), moderate in 2 (17%), while 1 (8%) patient died. Of 8 patients subjected to vagotomy and a second gastric resection, results were excellent in 2 (25%), good in 4 (50%), moderate in 1 (12.5%), while 1 (12.5%) patient died. One patient had been subjected to vagotomy and gastroenterostomy at another hospital 10 yr. previously without benefit; since no recurrence was evident, simple antrectomy was performed; 4 yr. later the patient was in good general condition. Selective vagotomies were never performed. Of 44 other patients with recurrent ulcer who were subjected to degastroenterostomy only, results were excellent in 22 (50%), good in 13 (30%), moderate in 7 (11%), while 2 (4%) patients died.

6165 COMPLETENESS OF GASTRIC VAGOTOMY BY THE SELECTIVE TECHNIC. (E.)
Griffith, C. A. (U. Washington Sch. Med., Seattle). Amer. J. Dig. Dis. 12(4):333-350, 1967.

In a series of 64 patients (51 men and 13 women, 19-64 yr. of age) who were treated for duodenal ulcer by bilateral selective gastric vagotomy together with pyloroplasty, completeness of gastric vagotomy was evaluated. Preoperative (12-hr. collections in 55 patients) and postoperative (85 tests were obtained early at 7 days and late from 6 mo.-5 yr.

postoperatively) basal gastric secretions were obtained and analyzed for vol., presence of bile and blood, pH, and the number of mEq of free and total acid per unit time. Postoperative insulin tests were conducted in 54 patients (68 tests). Hypersecretion was confirmed in 41 patients preoperatively. Postoperatively, 20 of 58 patients secreted free acid with 5 secreting more than 1.5 mEq/hr. free acid. One of these 5 patients showed no free acid in early testing, but converted to free acid in late testing. With respect to postoperative insulin testing, all 46 patients with tests unvitiated by duodenal reflux and/or inadequate hypoglycemia showed a clinical response to insulin (fall of true glucose to or below 45 mg% in 41 patients, to 30-50 mg% in 3 patients and the last 2 patients had a severe insulin reaction preventing blood sampling). Basing a positive response on an increase of at least 0.5 mEq in the first 2 hr. after inj., there were 40 negative, 5 positive and 1 questionable responses. One unique case showed pink basal and post-insulin specimens of gastric juice (pigment unknown) and that he was a true hypersecretor, after a seemingly complete vagotomy. It is concluded that preservation of hepatic and celiac-vagi by selective technic provides consistently complete or adequate vagotomy of the stomach in man based on positive encirclement and transsection of all gastric vagal branches.

6166 SELECTIVE GASTRIC VAGOTOMY TECHNIC AND PRIMARY RESULTS.

(E.) Amdrup, E. (Municipal Hosp., Copenhagen, Denmark), T. Clemmesen and J. Andreassen. Amer. J. Dig. Dis. 12(4):351-355, 1967.

A technically simple method for performing gastric vagotomy is described. The principle of this procedure is to omit free dissection of the individual nerve fibers and, instead, to divide the lesser omentum transversely from a point opposite the angular notch in toward the lesser curvature of the stomach; then, working from below upward, the lesser omentum is dissected free from the lesser curvature and from the distal 4 cm of the esophagus. A total of 74 patients were operated on using this method. An insulin test was carried out on 61 patients; it was negative in 54 cases, early positive in one and late positive in 6.

6167 OPERATIVE COMPLICATIONS OF GASTRODUODENAL ULCERS.

(E.) Széll, K. (Markusovszky Hosp., Szombathely, Hungary). Acta Chir. Acad. Sci. Hung. 7(4):417-424, 1966.

Of 2323 gastrectomies (1685 Billroth I, 590 Billroth II and 48 other types) performed in the treatment of gastroduodenal ulcer, complications resulted in 412 cases (19.5%). No observable difference between Billroth I and II procedures was evidenced with respect to both mortality rate (1.2%) and the incidence of postoperative complications, though the incidence of such complications was higher and more varied for Billroth II procedures, probably reflecting its threefold greater application. Most of the early complications were of a respiratory nature (76 patients, 12.9%; 211 patients, 12.5% for Billroth I and II procedures, resp.), while all other complications were less than previously described. These included for Billroth I and II operations, resp., wound infection and suppuration (0.85% and 1.1%), intestinal paralysis (0.85% and 0.54%), and suture insufficiency (0.51% and 0.59%), pleuritis (in Billroth II only at 0.65%), pulmonary infarction (0.34% and 0.53%), pneumonia (0.34% and 0.30%), phlebothrombosis (0.34% and 0.25%), hematemesis (0.34% and 0.18%), thrombophlebitis (0.17% and 0.25%), cerebrovascular disorders (0.34% and 0.12%). Other significant complications involved the cardiovascular (0.34% in Billroth I only) and urogenital systems. Obstruction and disorders of the intestinal tract accounted for 0.65% of complications (0.13% fatal).

6168 CONSERVATIVE SURGERY FOR BLEEDING PEPTIC ULCER.

(E.) Carruthers, R. K. (Gen. Infirm., Leeds, England), G. R. Giles, C. G. Clark and J. C. Goligher. Brit. Med. J. 1(5532):80-82, 1967.

Experience over 5 yr. with 112 patients treated by emergency operation for bleeding peptic ulcer was reviewed. Hemorrhage resulted from acute erosions in 13 patients, duodenal ulcer in 79, and gastric ulcer in 20 (in 6 with an associated duodenal ulcer). Radical surgery (usually Polya gastrectomy) was performed 55 times. The conservative operations, usually vagotomy and pyloroplasty with suture of the bleeding vessel were performed in 57 patients. Considering the survival rate for duodenal ulcer, gastric ulcer and erosions, conservative surgery had lower mortality with the exception of patients with erosions. Recurrent bleeding was observed in 8 patients after conservative surgery (4 required a second operation) and in 6 after radical surgery. A further operation was necessary in 11 patients treated by gastric resection. It is concluded that conservative surgery seems to be satisfactory in the treatment of bleeding duodenal ulcer, and warrants consideration in the treatment of gastric ulcer. The place of conservative surgery in the treatment of erosions remains uncertain.

6169 STUDIES RELATED TO THE PATHOGENESIS OF CURLING'S ULCER.

(E.) O'Neill, J. A., Jr. (Brooke Army Med. Ctr., Fort Sam Houston, Texas), B. A. Pruitt, Jr., J. A. Moncrief and W. E. Switzer. J. Trauma 7(2):275-287, 1967.

Clinical experience with 193 cases of Curling's ulcer seen over a 13 yr. period were reviewed.

he yearly incidence varied widely but av. 12.5%.
t was considered that the "true" percentage
as probably higher. The majority of the
atients presented with bleeding without
ssociated symptoms. In 42 of 193 patients
here were no symptoms whatever, and the ulcers
ere discovered at autopsy. The majority of the
lcers were gastric and usually multiple. All
lcers appeared to be acute with minimal
nflammatory reaction. The majority of the
lcers had stainable bacterial or fungus
rganisms on the surface of the crater. Sepsis
controlled in a large fraction of the popula-
ion by topical sulfonamide) shock, hemocon-
entration and absolute hyperacidity (only 4 of
4 patients had in excess of 25 mEq/12 hr.) were
ot considered adequate explanations for the
tiology of Curling's ulcer. It is suggested
he ulcers may be related to decreased mucosal
esistance due to a decreased rate of gastric
ucus production. Surgical treatment resulted
n survival in 45% of 20 cases of Curling's
lcer, with massive hemorrhage. It is suggested
hat surgery should routinely be considered for
hese patients when conservative treatment fails.

170 DISTRIBUTION OF GASTRIC AND DUODENAL ULCER IN AFRICA. REVIEW OF LITERATURE
F THE LAST 40 YEARS (1927-1966). (Ger.)
iesfeld, H. J. (U. Heidelberg, Germany). Ther.
egenw. 106(4):500-512, 1967.

171 ACUTE COMPLICATIONS OF GASTRODUODENAL ULCERS. MASSIVE GASTROINTESTINAL
EMORRHAGE, PERFORATION INTO FREE PERITONEUM
ND PYLORIC SYNDROME. (Sp.) Meeroff, M.
Araoz Alfaro Clin., Lanus, Argentina), O. N.
ellizari, R. Celestino, A. Folino, A. M. Luis,
. Goschinsky and J. C. Meeroff. Galicia Clin.
9(4):264-271, 1967.

172 MASSIVE DIGESTIVE HEMORRHAGE IN GASTRODUODENAL ULCER. (Sp.) Ayala,
. L., I. A. Chahud, R. H. Espejo and M. R.
akino. Dia Med. 39(14):224-227, 1967.

173 TREATMENT OF PERFORATED GASTRIC AND DUODENAL ULCERS. (Pol.) Dyktyński,
. (L. Pasteur Hosp., Lodz, Poland) and R.
abza. Wiad. Lek. 20(6):549-552, 1967.

174 SODIUM CONCENTRATION IN THE SWEAT OF PATIENTS WITH GASTRIC AND DUODENAL
LCER. THE VALUE OF SWEAT ELECTROLYTE DETER-
INATION IN DETECTING ADULT MUCOVISCIDOSIS.
Pol.) Singer, Z. (Ist Int. Dis. Clin.
atowice, Poland), M. Machalski and S. Kowalski.
ol. Arch. Med. Wewnet. 38(2):211-216, 1967.

175 ACUTE EROSIONS AND ULCERS OF THE GASTROINTESTINAL TRACT FOLLOWING OPERATIONS. (Rus.) Vantsian, E. N. (Ist Moscow Med. Inst.) and N. K. Matveev. Klin. Khir. (Kiev) (2):17-22, 1967.

6176 FREQUENT ASSOCIATION OF DUODENAL ULCER WITH RHEUMATIC DISEASE. (It.) Berto, R. (Civil Hosp., Verona, Italy). Gazz. Sanit. (Ital.) 37(12):608-611, 1966.

6177 GASTRIC ULCER--A DIFFERENT DISEASE FROM DUODENAL ULCER. (E.)(Rev.) Eisenberg, M. M. (U. Florida, Gainesville) and E. R. Woodward. Pacif. Med. Surg. 75(2):86-91, 1967.

6178 MONITORING OF UPPER GASTROINTESTINAL TRACT pH: A NEW TOOL IN THE EVALUATION OF ACID-PEPTIC DISEASE. (E.) Miller, F. A. (Creighton U. Sch. Med., Omaha, Nebr.). Pacif. Med. Surg. 75(2):92-95, 1967.

6179 EFFECT OF A SULFATE-ALKALINE-SILICIC MINERAL WATER (VAL MÀSINO WATER) ON THE HYPERACIDITY OF GASTRODUODENAL ULCER. (It.) Mars, G. (U. Milan, Italy). Settimana Med. 54(20):1143-1152, 1966.

6180 IMMEDIATE AND DELAYED RESULTS OF HEMIGASTRECTOMY ASSOCIATED WITH VAGOTOMY IN DUODENAL ULCER. (Por.) Rosenberg, D., F. De Camargo Vianna, J. P. Chacon, J. A. De Mello Saraiva and P. A. J. Faria. Rev. Ass. Med. Brasil. 12(1):7-12, 1966.

6181 LATE RESULTS AFTER GASTRECTOMY FOR GASTRIC AND DUODENAL ULCERS. (Ger.) Tenew, S. (U. Clin. Sofia). Bruns Beitr. Klin. Chir. 214(2):188-193, 1967.

6182 SURGERY FOR PEPTIC ULCER IN PATIENTS WITH CHRONIC LUNG DISEASE. (E.) Okinaka, A. J. (New York Hosp.-Cornell Med. Ctr., N. Y.). Amer. J. Surg. 113(4):545-550, 1967.

6183 SIGNIFICANCE OF PATHOLOGIC LIVER FINDINGS IN GASTRODUODENAL ULCER AND PEPTIC ULCER OF THE JEJUNUM. (Ger.) Zittel, R. X. (U. Clin. Freiburg i. Br., Germany), H. Weyand and F. Weyand. Deutsch. Med. Wschr. 92(17):791-793, 1967.

6184 TREATMENT OF DUODENAL ULCER IN A SMALL METROPOLITAN COMMUNITY HOSPITAL. (E.) Casten, D. F. (Sydenham Hosp., New York, N. Y.), A. Larkin and F. G. Quiroga. Amer. J. Surg. 113(3):335-339, 1967.

6185 DEFINITIVE SURGICAL THERAPY FOR PERFORATED PEPTIC ULCER. A REVIEW OF FIFTY-TWO CONSECUTIVE CASES. (E.) Tolley, J. A. (Ross-Loos Clin., Los Angeles, Calif.) Amer. J. Surg. 113(3):327-334, 1967.

6186 GASTRIC "FREEZING"--A CLINICAL DOUBLE-BLIND STUDY. (E.) Zikria, B. A. (Columbia U., New York, N. Y.), R. S. De Jesus, W. R. Cunnick and J. M. Ferrer, Jr. Amer. J. Gastroent. 47(3):208-214, 1967.

6187 ACTIVITY OF CHOLINESTERASES IN PATIENTS WITH ULCER DISEASE TREATED WITH PARTIAL GASTRECTOMY. (Pol.) Dacka, E. (1st Surg. Clin., Lublin, Poland) and S. Jabłonka. Pol. Przegl. Chir. 39(3):255-259, 1967.

6188 DUODENAL STASIS AND ULCER DISEASE. (Rus.) Mirzaev, A. P. (Leningrad Sanit.-Hyg. Med. Inst., USSR). Vestn. Khir. Grekov 98(1):61-65, 1967.

6189 CHANGES IN THE POTASSIUM AND SODIUM CONTENT AFTER GASTRECTOMY FOR ULCER DISEASE. (Rus.) Kryzhanovskii, A. I. (Krasnodar Med. Inst., USSR). Vestn. Khir. Grekov 98(1):70-73, 1967.

6190 ACTIVATION OF THE UREASE-CARBONIC ANHYDRASE ENZYME SYSTEM IN THE TREATMENT OF GASTRODUODENAL DISEASE. (Fr.) Pascal, J. P. (Purpan Hosp., Toulouse, France), J. L. Gouzy and M. Duffau. Rev. Med. Toulouse 3(3): 239-245, 1967.

6191 BENIGN AND MALIGNANT GASTRIC ULCERS. DIAGNOSTIC ACCURACY--X-RAY EXAMINATIO IN DIFFERENTIATING. (E.) Bartness, J. Minn. Med. 50(4):505-507, 1967.

6192 PEPTIC ULCER DISEASE IN CHILDREN. PART I. CLINICAL AND LABORATORY STUDY. (E.) Krakauer, L. J. (U. Oregon Med. Sch., Corvallis, Oregon), J. R. Berry and J. A. Stewart. Northwest Med. 66(4):348-351, 1967.

6193 PEPTIC ULCERATION AND ENTERITIS. A DIFFERENTIAL DIAGNOSIS. (E.)(Rev.) Jesseph, J. E. (Ohio State U. Hosp., Columbus), F. T. Moore, G. Endahl and R. B. Passi. Amer. J. Surg. 113(2):188-193, 1967.

6194 EFFECT OF CERTAIN GANGLIOPLEGIC, CHOLINOLYTIC AND MYOTROPIC SPASMOLYTI DRUGS ON EXPERIMENTALLY INDUCED GASTRIC ULCER I RATS. (Bul.) Manolov, P. Eksper. Med. Morfol. 5(1):36-41. 1966.

See also abstract nos.: 6030,6042,6043

195 CLINICAL STUDY OF CROHN'S ILEO-COLITIS.
(Fr.) Vantrappen, G. (Saint Raphael
., Louvain, Belgium), E. Lens, J. Vandenbroucke,
. Bodart and C. Dive. Arch. Franc. Mal. Appar.
ig. 55(12):1129-1148, 1966.

n 29 men and 15 women with Crohn's disease
only 12 were over 30 yr. old at onset), the
rincipal symptoms were diarrhea (55%), epigas-
ric or right iliac fossa pain (32% in each
ase) and isolated, external fistulas (13.5%);
rthralgia sometimes preceded the onset of these
ymptoms. Melena was infrequent and usually not
bundant; leukocytosis and wt. loss indicated
xacerbation of the disease. Internal fistulas
ere present in 21 cases (48%) and were most
requent in the presence of segmental involve-
ent; 5 of the 14 patients in this group showed
ouble fistulas. The right hemicolon was
nvolved in 43% (19 cases) and the entire colon
n 25% (11 cases). No fulminant hemorrhage,
oxic megacolon, overt perforation or malignant
ransformation was noted in this group.
orticosteroids (unspecified) were admin. to 34
atients (77%), all with segmental or total
involvement (65% had fistulas, but this was not
considered an absolute indication for cortico-
steroid therapy); 14 of these patients later
underwent surgery (the most effective procedure
was resection of the lesions), 8 of them (57%)
after over 1 yr. of improvement without corticosteroid treatment. Of the 20 patients treated with corticosteroids without surgery, 8 (40%) remained in good condition after the end of corticosteroid therapy and 9 (45%) were well and on corticosteroids at the time of report; 2 patients failed to respond to corticosteroids. Surgery was performed in 17 patients in all; 2 died in the postoperative period, 11 patients responded well (8 required no steroid therapy) and 5 patients had recurrent disease at the time of report.

6196 CROHN'S DISEASE OF THE COLON. (Heb.) Simon, J., J. Munk, D. Barzilai, A. Schramek and J. Geresh. Harefuah 72(7):257-261, 1967.

6197 THE DIFFERENTIAL DIAGNOSIS OF TERMINAL ILEITIS (CROHN'S DISEASE.) (Rus.) Gutnik, E. I. (Kiev Inst. Postgrad. Med. Train., USSR). Klin. Khir. (Kiev) (3):46-48, 1967.

6198 EXPERIENCE WITH REGIONAL ENTERITIS AT TWO HOSPITALS. (E.) Hodosh, S. (Wadsworth Hosp., Los Angeles, Calif.) and E. Passaro, Jr. Amer. Surg. 33(3):234-237, 1967.

6199 ACUTE PERFORATION OF THE SMALL INTESTINE IN REGIONAL ENTERITIS. (E.) Sewell, J. H. (Fort Worth Clin., Tex.). Amer. J. Gastroent. 47(2):148-152, 1967.

6200 ABSORPTION AND NET METABOLISM OF D-FRUCTOSE, L-SORBOSE AND SORBITOL IN HEREDITARY FRUCTOSE INTOLERANCE AND IN HEALTHY INFANTS. (Ger.) Beyreiss, K. (Karl Marx U. Leipzig, Germany), H. Willgerodt and H. Theile. Acta Biol. Med. German. 17(6):733-745, 1966.

Absorption and net metabolism of fructose, sorbose and sorbitol were compared in healthy infants and in a child with hereditary fructose intolerance. After admin. p.o., only 30-40% of the fructose was found in the peripheral blood of healthy control infants, whereas all of it was found in the peripheral blood of the child with hereditary fructose intolerance. This suggested the absence of phosphofructoaldolase and the lack of fructose metabolism in the intestinal mucosa. After p.o. admin. of sorbose, approx. 30% of it was found in the peripheral blood of both control infants and the child with hereditary fructose intolerance. Blood levels of glucose and fructose were similar after i.v. infusion of sorbitol or fructose in the infant with hereditary fructose intolerance. After p.o. admin. of sorbitol, blood glucose decreased in hereditary fructose intolerance in spite of small absorption of sorbitol. Net metabolism of fructose was not markedly decreased in hereditary fructose intolerance; however, fructose was metabolized with increased blood levels. The net metabolism of sorbose was markedly decreased. The results are discussed with regard to the mechanism of absorption of fructose.

6201 USE OF MEDIUM CHAIN TRIGLYCERIDES IN MALABSORPTION. (E.) Greenberger, N. J. (Ohio State U. Hosp., Columbus), R. D. Ruppert and M. Tzagournis. Ann. Intern. Med. 66(4):727-734, 1967.

Use of triglycerides containing medium chain fatty acids was studied in a group of 12 patients with malabsorption. Medium-chain triglyceride therapy produced a significant decrease in steatorrhea in 9 patients; in 6 of these there was a minimal but definite gain in wt. Severe, disabling diarrhea was improved in 6 patients. The most striking improvement occurred in 5 patients with regional enteritis; lesser degrees of improvement occurred in patients with Laennec's cirrhosis, carcinoma of the pancreas, scleroderma and pancreatic insufficiency. Two patients developed increased diarrhea and abdominal pain while receiving medium-chain triglyceride therapy. No significant change in blood glucose, plasma nonesterified fatty acid and serum insulin levels was observed in 10 normal subjects after ingestion of 30 ml of medium-chain triglyceride oil. It is concluded that medium-chain triglyceride therapy may be a valuable nutritional adjunct in patients with malabsorption.

6202 OSTEOPOROSIS, INTESTINAL LACTASE DEFICIENCY AND LOW DIETARY CALCIUM INTAKE. (E.) Birge, S. J., Jr. (Barnes Hosp., St. Louis, Mo.), H. T. Keutmann, P. Cuatrecasas and G. D. Whedon. New Eng. J. Med. 276(8): 445-448, 1967.

Normal results were obtained in a group of 10 patients with confirmed osteoporosis and 13 normal subjects given oral lactose tolerance tests, whereas decreased lactose absorption was indicated in a group of 9 osteoporosis patients. Accuracy of the test was confirmed by its use in determining jejunal enzyme levels in 11 subjects. Lactase deficiency was considered to be demonstrated when the percentage ratio of max. elevation in blood sugar, following lactose admin., to the max. elevation achieved by admin. of a mixture of 25 g glucose and 25 g galactose was less than 50%. All 9 patients were diagnosed as having primary lactase deficiency which was supported by normal findings with respect to serum proteins and carotene, xylose tolerance, stool fat and upper gastrointestinal roentgenograms. All lactase deficient patients related histories of long-standing milk intolerance (severe in 6 and mild in 3) along with lactose malabsorption and very low dietary milk and Ca intake (200±50 mg was the mean daily intake over approx. the preceding 10-yr. period). Attempts at induction of lactase activity in 5 deficient patients by lactose admin. (15 g/daily reduced to 7.5 g/day) were unsuccessful after a 3-mo. course of treatment. The positive correlation between primary lactase deficiency and osteoporosis may indicate a single biochemical form of the bone disease. It is suggested that voluntary Ca restriction to preclude any symptoms of lactose intolerance inaugurated by drinking milk may be a partial cau of osteoporosis in lactase-deficient patients.

6203 A LIGHT AND ELECTRON MICROSCOPIC STUDY OF SIGMOID COLONIC MUCOSA IN ADULT CELIAC DISEASE. (E.) Pittman, F. E. (U. Birmingham, England) and J. C. Pittman. Scand. J. Gastroent. 1(1):21-27, 1966.

Sigmoidoscopic and light microscopic examinations of sigmoid colonic mucosa of 4 untreated and 2 treated (treated with a gluten-free diet for periods of 6 mo. and 2 yr., resp.) patients with adult celiac disease were normal. When mucosa from the 4 untreated patients was studied under the electron microscope, abnormalities of the microvilli were seen, with collections of finely granular material, similar to apical cytoplasm, within the microvillous borders of principal cells and in the lumens of crypts; this material seemed to be exuded from microvilli. There were no ultrastructural abnormalities observed in the mucosa obtained from the patients after successful treatment with a gluten-free diet. Gliadin peptides, obtained by digestion with trypsin and pepsin, produced minimal microvillous changes when given as an enema to 1 patient who had been treated for 6 mo. with a gluten-free diet.

4 REGULATION OF INTESTINAL ALKALINE
PHOSPHATASE LEVELS IN THE RAT. ROLE
THE ADRENAL CORTEX. (E.) Watson, W. C.
y. Infirm., Glasgow, Scotland), E. S. Murray
M. D. Gardner. J. Clin. Path. 20(2):185-189,
7.

ateral adrenalectomy caused a reduction in
alkaline phosphatase conc. in the rat
le Wistar) intestine, which was not prevented
admin. of saline (1%); this effect was
evented by admin. of cortisone (2.5 mg
rtisone acetate). Admin. of ACTH (4 U/day x
s.c.) to normal rats produced a rise in
estinal alkaline phosphatase levels
sociated with a small increase in adrenal
and wt.; admin. of hydrocortisone (1 mg or 10
/day for 10 days; s.c.) produced large
creases in the enzyme, with doses (10 mg) that
used significant hypoplasia of the adrenal
ands. The significance of these results in
lation to mechanisms of fat absorption and the
eatment of steatorrhea is discussed.

05 SMALL INTESTINE STUDIES IN GIARDIASIS.
(E.) Cantor, D. (Nat. Inst. Health,
enos Aires, Argentina), L. Biempica, H.
ccalino and J. C. O'Donnell. Amer. J. Gastroent.
(2):134-141, 1967.

junal biopsies (along with X-ray and
boratory studies) were performed in 22
ildren (14 males and 8 females aged 18 mo.-
yr. of age) infested with Giardia lamblia and
whom chronic diarrhea was the main sign in an
tempt to establish a positive relationship, if
y, between this parasite and malabsorption.
l children were in good general health (1
tient with Cooley's anemia). Roentgenological
terations were nonuniform and included wide
men (6), thick folds (4), mucosal coarsening
), flocculation (1), segmentation (7),
ypermotility (6) and normal picture (6). Only
case showed an X-ray pattern consonant with
alabsorption syndrome. The fat balance test
measured by the Van de Kamer test) was normal
16 cases, slightly elevated in 4 cases and
ncreased markedly in just one case. Histologi-
al examination showed a nonspecific pattern
ith changes confined to the lamina propria and
ncluded congestion (mostly in the villi),
dema, and round cell and eosinophil infiltration.
dema frequently produced a mild and non-
eneralized clubbing of the villi and dissocia-
ion of glands. It is concluded that mal-
bsorption syndrome and giardiasis are distinct
athological conditions.

206 THE KINETICS OF INTESTINAL ABSORPTION
OF RADIOHIPPURAN IN CONTROL SUBJECTS
AND IN PATIENTS WITH INTESTINAL MALABSORPTION.
(E.) Turco, G. L. (U. Turin, Italy), P. De
Filippi and G. Segre. J. Nucl. Biol. Med.
10(2):52-57, 1966.

A mathematical model was described by which it was possible to calculate the kinetics of the passage of ^{131}I-hippuran from the human gastrointestinal tract into the blood. ^{131}I-hippuran, an essentially inert molecule, was considered to meet the requirements for a test substance for intestinal absorption studies. Nine normal subjects and 4 patients showing the malabsorption syndrome were studied. Blood and urine levels were determined after i.v. and p.o. admin. of ^{131}I-hippuran. After 25 μc was inj. i.v., blood was sampled and counted for radioactivity every 2-5 min. for 25-30 min. After 1 wk. each subject received 75 μc of radiohippuran by mouth. Following p.o. admin. blood was sampled and counted for 150 min. The data collected were fitted to a 4-compartment model using a digital computer, and values for transfer constants between venous compartments obtained. It was found that, in patients with malabsorption syndrome, the transfer constant representing the passage of the tracer across the intestinal wall was markedly affected, whereas the blood kinetics did not appreciably differ from those observed in the normals. The method is felt to have potential diagnostic value in malabsorption syndromes.

6207 DISACCHARIDASE ACTIVITIES IN MILK-SENSITIVE AND CELIAC PATIENTS. (E.) Lubos, M. C. (U. Saskatchewan, Canada), J. W. Gerrard and D. J. Buchan. J. Pediat. 70(3) (Pt. 1):325-331, 1967.

Fifty-six children were studied, 18 sensitive or intolerant of milk, 22 with celiac disease, and 16 with a variety of other conditions other than malabsorption. Peroral intestinal biopsy was carried out, an attempt being made to obtain the specimen near the ligament of Treitz. Oral lactose tolerance tests were performed in 13 milk-sensitive patients and in 5 celiac ones. Lactose (2 g/kg) was admin. and blood sugar determinations made periodically. All intestinal biopsies from the milk-sensitive group revealed normal histology. There was no difference in the mucosal disaccharidase activities of this group and the control group. A flat blood sugar curve was found in 6 of 13 patients following lactose challenge. Only 1 patient experienced diarrhea following admin. of lactose. Improvement in mucosal morphology was noted in 6 of the treated celiac patients; all treated patients showed significantly decreased disaccharidase activities compared to controls. Untreated celiac patients showed clearly marked villous atrophy; 5 of these 6 patients showed flat lactose tolerance curves. Disaccharidase activity was significantly below normal. It is concluded that lactose intolerance does not appear to be the primary cause of the diarrhea in milk-sensitive patients, since the disaccharidase activity of these children fell within normal limits. Reduced disaccharidase activity was noted in celiac patients, but no evidence of lactose intolerance was present.

6208 EFFECTS OF PROLONGED GLUTEN FEEDING IN HEALTHY SUBJECTS. I. SERUM LIPIDS AND FATTY ACID PATTERNS. (E.)

Gormican, A. (2015 Summit Ave., St. Paul, Minn.), M. A. Ohlson and M. Osborn. J. Amer. Diet. Ass. 50(2): 122-125, 1967.

Total serum lipids and serum fatty acids were determined in 2 healthy 33-yr.-old volunteer males maintained on a high-gluten diet in a metabolic ward for 5 mo. After a 1-wk. control period on a general diet, the subjects were placed on a metabolic diet designed to maintain normal constant wt. and to provide approx. 50% of the total daily protein intake in the form of gluten; the basic diet contained 2,600 calories provided by 126 g protein (including 51 g gluten in the form of desserts and breadstuffs), 270 g carbohydrate and 114 g fat. Fasting and post-test meal serums were analyzed; serum lipids were analyzed monthly for blood lipid patterns at 1, 3, 5 and 7 hr. after ingestion of fat tolerance meals. Gas-liquid chromatography was used for fatty acid analysis. Serum lipids increased after the test meal in both subjects during the study. Elevated serum lipids were sustained 7 hr. after the test meal as the study progressed. There was considerable variation in the serum saturated and unsaturated fatty acids. In 1 subject, there was a marked increase in serum palmitic acid, with a lesser relative increase in serum oleic acid. The percentage of oleic acid was measurably increased after a test meal containing triolein. As the experiment progressed, the monthly fat meal induced more intense and more prolonged lipemia.

6209 STUDIES ON PROPHYLAXIS OF COW'S MILK ALLERGY BY DIGESTIVE ENZYMES. (E.)

Gamo, I. (Osaka U. Med. Sch., Japan), H. Yabuuchi, M. Nishida, T. Ikeda, T. Ichihara and K. Toyoshima. Acta Paediat. Jap. [Overseas] 8(15):1-12, 1966.

Seven cases of breast-fed infants allergic to cow's milk are described. The patients were 1-4 mo. old, in whom the disease began with such symptoms as urticaria, eczema and diarrhea. Cow's milk allergy was diagnosed by the provocation test, and aggravation of symptoms occurred by drinking human milk after taking cow's milk. The passive cutaneous anaphylaxis reaction confirmed that cow's milk antigen is transmitted to human milk after consuming cow's milk; electrophoresis and chromatography showed that this antigen exists in both the protein and peptide fractions. The passive cutaneous anaphylaxis reaction was markedly weakened in human milk after taking digested cow's milk. These results suggest that the mother's intake of cow's milk should be noted when admin. treatment by removal of the antigen in infants who are allergic to cow's milk during the period when they are fed with human milk.

6210 NEUROLOGICAL DISORDERS ASSOCIATED WITH ADULT COELIAC DISEASE. (E.)

Cooke, W. T. (U. Birmingham, England) and W. T. Smith. Brain 89(4):683-722, 1966.

Neurological disturbances are reported along with clinical, laboratory and autopsy findings (9 of 16 patients) in 16 patients (11 men and 5 women, aged 26-68 yr.) with adult celiac disease, the duration of which varied between 5 mo.-9 yr. Clinical findings included symptoms affecting the legs especially sensory ataxia, less severe and common symptoms involving the arms (3 patients were unable to write legibly or manipulate buttons), peripheral neuritis, diminished muscle power, incoordination of legs, unconsciousness (6 patients), cerebellar dysfunction (3 patients). All patie showed flexor plantar reflexes (except for one showed an extensor reflex prior to death). Lab ratory findings included uniform steatorrhea, achlorhydria (3 patients), impaired ^{58}CoB$_{12}$ (3 9 patients tested), osteomalacia (5 patients), positive test for toxoplasmosis (3) and one patient manifested persistent high WBC count. Pathological alterations are detailed for the cerebral cortex, basal ganglia, hypothalamus, cerebellum, brain-stem, spinal cord, sensory ganglia and peripheral nerves. No amelioration neuropathy was associated with absence or admin of folic acid, vitamin B$_{12}$ or a gluten-free die At the time of the report, 9 patients have died with neuropathy being the primary cause in 4 patients and a significant contributing factor another 4 patients. One case died from a rapid progressive neuropathy 3 mo. after appearance o symptoms, while another died from a reticulosar of the small intestine. Six patients have mani ted steady improvement, with no change in neuro athy or disability after 1-7 yr.

6211 STUDIES ON THE INTESTINAL ABSORPTION OF ^{3}H-FOLIC ACID IN IDIOPATHIC SPRUE.

(Ger.) Kistler, H. J. (U. Zurich, Switzerland), J. R. Schmid, E. Pfenninger, U. P. Haemmerli and P. G. Frick. Gastroenterologia (Basel) 106(3):204-216, 1966.

The malabsorption syndrome of idiopathic sprue (1-40 yr. duration) was observed in 10 patients (4 men and 6 women, 38-75 yr. old), all having suffered from a macro-megalocytic anemia, which responded not only to vitamin B$_{12}$ but also to folic acid therapy. Folic acid deficiency is seldom seen in idiopathic sprue, whereas it is a prominent feature of tropical sprue. Of these 10 patients, 4 had a severe degree of malabsorption, 4 showed partial remission and 2 complete remission; 8 had received B$_{12}$ treatment for anemia; 3 were on a gluten-free diet and 2 on a low-gluten diet; there was no correlation between B$_{12}$ treatment or diet and the degree of malabsorption. No correlation was found in the tests on absorption of folic acid, the fecal fat conc., histological stage of intestinal mucosa, and B$_{12}$ conc. in the stool among other determinations. Thus, only 1 patient showed a slightly abnormal nount of B_{12} in the feces (9.1%; below 8% is rmal); 1 case in Stage 3 was normal in every espect, except for absorption of folic acid; nother patient, also in Stage 3, had greater nan normal absorption of folic acid. The ritiated folic acid was measured by its radioctivity. Although in general the absorption folic acid was less in the patients with prue (half the normal level) the plasma clearnce of folic acid introduced i.v. was much ore rapid than in normal individuals (twice as ast). The slowed rate of folic acid absorption ay have been due to decreased conc. of enzymes cting upon folic acid. Tests of disaccharide onc. in controls and in 8 patients with idioathic sprue showed that conc. of maltase, somaltase, saccharase and lactase were below ormal in 5,4,3, and 7 instances, resp. and in he low or very low normal ranges in 2,4,5, and instances, resp.; maltase and lactase were ach in av. normal range in 1 instance. It is uggested that patients with idiopathic sprue e treated with parenteral folic acid at an arly stage.

212 MALABSORPTION SYNDROME OBSERVED AFTER THE MASSIVE RESECTION OF THE SMALL NTESTINE. (Jap.) Matsumoto, S. (Hokkaido U. ed. Sch., Sapporo, Japan), T. Ito, S. Suzuki, . Iwazaki, A. Okuno, W. Nagano, K. Nakayama, N. hida and T. Haraguchi. Shonika Rinsho (Jap. J. ediat.) 20(1):77-91, 1967.

ne case is presented of a secondary malabsorpion syndrome in a 16-yr.-old male due to assive resection of the small intestine 11 yr. previously. The patient was in an automobile ccident at the age of 5. Due to rupture of the liver and damage to the small intestine, surgery was done to resect about two-thirds of the small intestine and to make a jejunum-descending colon anastomosis and blind loop of a part of the jejunum. Some symptoms indicating malnutrition, such as small body structure, edema, petechiae and anemia, gradually developed 5 yr. after the accident. They became severe after 10 yr. (RBC number 2.0 x 10^6). Absorption tests showed marked malabsorption, especially of K, Ca, phosphate, Mg, fats, fat-soluble vitamins and vitamin B_{12}. The admin. of these substances markedly improved the general condition.

6213 XYLOSE VALUES IN THE BLOOD AFTER ORAL ADMINISTRATION OF D-XYLOSE IN INFANCY IN PHYSICAL AND PATHOLOGICAL CONDITIONS. (It.) Calabri, G. (U. Florence, Italy), F. Falcini and A. Becciolini. Riv. Clin. Pediat. 78(2): 464-469, 1966.

6214 RADIOLOGIC CHANGES IN THE DIGESTIVE TRACT IN DISORDERS CHARACTERIZED BY INTESTINAL MALABSORPTION. (It.) Della Cella, G. (U. Genoa, Italy). Minerva Pediat. 18(14): 738-741, 1966.

6215 A STUDY OF THE INTESTINAL ABSORPTION OF PROTEIN IN CARDIAC INSUFFICIENCY. (It.) Albano, O. (U. Bari, Italy), A. Patimo and A. Francavilla. Minerva Gastroent. 12(4): 129-132, 1966.

6216 A STUDY OF THE INTESTINAL ABSORPTION OF VITAMIN A IN CARDIOPATHY. (It.) Albano, O. (U. Bari, Italy), G. Martellotta and A. Francavilla. Minerva Gastroent. 12(4): 132-135, 1966.

6217 MALABSORPTION SYNDROME ASSOCIATED WITH IMMUNOLOGICAL ABNORMALITIES IN THE INTERSTITIAL CELLS OF THE GASTROINTESTINAL MUCOSA. (Fr.) Crabbé, P. A. (St. Pierre U. Cljn., Louvain, Belgium), J. F. Heremans, A. Mortiaux, G. Isaac and C. Harvengt. Arch. Mal. Appar. Dig. 56(1-2):33-52, 1967.

6218 BIOPSY OF THE SMALL INTESTINE IN SYNDROMES OF MALABSORPTION AND CHRONIC DIARRHEA IN ADULTS. DATA PROVIDED BY JEJUNAL BIOPSY. (Fr.) Vachon, A. (Hotel-Dieu, Lyon, France), P. Paliard, M. Abry and J. Barthe. Arch. Mal. Appar. Dig. 56(1-2):5-16, 1967.

6219 RELATIONSHIP BETWEEN IDIOPATHIC SPRUE AND MALIGNANT TUMORS OF THE SMALL INTESTINE. CLINICAL DEMONSTRATION. (Ger.) Wyss, F. (U. Bern, Switzerland) and F. Halter. Praxis 56(15):506-513, 1967.

See also abstract nos.: 5661,5662,5760,6044

6220 HIRSCHSPRUNG'S DISEASE--THE DUHAMEL MODIFICATION. (E.) Newbern, W. R. (130 Butler St., West Palm Beach, Fla.). Amer. J. Gastroent. 47(1):61-68, 1967.

Results of this modified surgical procedure (by which a new combined rectal ampulla with the posterior half composed of normal colon is created) in 4 children with Hirschsprung's disease is reported. A successful application of this modified procedure was carried out in a 10-mo.-old male infant in order to partially resect a prolapsed distal loop of a colostomy which had been performed at age 4 wk. Except for frequent soft stools, which became regular and formed after 3 mo., no postoperative complication was encountered. Adequate peristalsis was demonstrated in the rectal stoma. Another patient with aganglionic disease of the rectum and sigmoid, had the involved distal segment resected and the distal end of the left colon pulled through as a left colostomy. Two wk. later a right transverse colostomy was performed which was subsequently complicated by recurrent respiratory infections. A minor wound infection occurred in this case, but pelvic abscesses, evident peritonitis, fecal impaction or diarrhea did not occur. In 2 other infants with Hirshsprung's disease, Duhamel modification was completed without complication. In view of the excellent results achieved, along with the need of less pelvic dissection as well as less operative shock and maintenance of adequate peristalsis, the modified Duhamel procedure is recommended for the treatment of Hirschsprung's disease.

6221 DETRUSOR INHIBITION INDUCED FROM ANAL REGION IN MAN. (E.) Pompeius, R. (Sahlgrenska Hosp., Goteborg, Sweden). Acta Chir. Scand. 132(Suppl. 361):1-54, 1966.

Detrusor inhibition elicited by anal stimulation is supposedly due to an inhibitory reflex via the spinal cord. The present investigation comprises a study of the receptor mechanism and the afferent part of the reflex arc, a study of the level of the supposed spinal reflex and a study of the supraspinal influences upon the reflex in patients under general anesthesia and in patients with cerebral lesions. A brief summary of the anatomy and neurophysiology of the anal and lower genitourinary region is given. Material for this study included 76 patients (53 men, 23 women, with a mean age of 60 yr.) with various urological and neurological disorders. Cystometry (recording of the intravesical pressure changes) was used to study the effect of anal stimulation upon rhythmic detrusor activity and micturition contractions. Following local anesthesia of the anal and perianal skin (4 cases), anal mucosa (24) and of the internal anal sphincter (5), detrusor activity was still inhibited by anal stimulation in 4 of 4, 20 of 24 and 4 of 5, resp. When the external anal sphincter, lower part of the ana mucosa and the ano-perianal skin was anestheti (4 cases), no inhibition was recorded during anal stimulation (0 of 4). Inhibition of detrusor activity during anal stimulation was recorded in 7 of 10 observations in 9 patients with complete spinal cord transection. No inhibition was recorded by anal stimulation in 3 cases with an incomplete lesion of the conus medullaris or the cauda equina. An inhibition of detrusor activity was recorded in 3 of 4 patients who had bilateral total adrenalectomy. In 5 patients in whom the urinary bladder had been replaced with an isolated sigmoid segment, inhibition of its motor activity was noted in 4 during anal stimulation; no inhibition was recorded in 5 patients in whom the lower ileum had been used for the same purpose. In nearly all of 25 patients, touch and painful stimulation of the ano-perianal region had an inhibitory effect upon detrusor activity. In 4 patients in whom detrusor activity was inhibite by anal stimulation or painful stimulation of the anal skin, no inhibition was recorded when painful stimuli were applied to skin dermatomes outside the sacral region. Anal stimulation had an inhibitory effect upon detrusor activity in 7 of 8 patients with various cerebral lesion who had no bladder control. The same effect was found in 2 of 3 patients under hexobarbital anesthesia. Several conclusions were made on the basis of these results: 1) receptors for the anovesical inhibitory mechanism are located in that part of the anal region that is somatically innervated through the pudendal nerve; 2) detrusor inhibition induced by anal stimulation is due to a segmental reflex that traverses the sacral part of the spinal cord; no evidence was found for the sympathetic nervous system as a mediator of this reflex; and 3) the anovesical inhibitory reflex can be released in the neurologically healthy man without important facilitatory influences from supraspinal sources. The significance of the anovesical inhibitory reflex for urinary retention after surgery of the anal region and as a complication to acute anal disorders is discussed; it is suggested that the anovesical inhibitory reflex is partially responsible for this urinary retention. A similar mechanism is partly responsible for urinary retention after operations in the perineum and around the vulva. Measures to decrease the frequency of postoperative urinary retention after anoperianal surgery are also discussed.

6222 ABSORPTION AND SECRETION OF ELECTROLYTES AND WATER BY THE HUMAN COLON, WITH PARTICULAR REFERENCE TO BENIGN ADENOMA AND PAPILLOMA. (E.) Shields, R. (Welsh Nat. Sch. Med., Cardiff, Wales). Brit. J. Surg. 53(10): 893-897, 1966.

absorption and secretion of electrolytes water by the colon was studied in 13 males ng modified Tyrode's soln, which contained a (2 μC/liter soln.), ^{42}K (4 μC/liter soln.), (1% vol./vol.) and as a nonabsorbed erence substance, polyethylene glycol of ecular wt. 4,000 (1% wt./vol.). Five were ients with benign neoplastic disease of the ge intestinal mucosa: 2 with villous illoma of the rectum, 2 with multiple poly- is of the entire large intestine and the th patient was studied before and after the oval of polyps by local resection of the moid colon and fulguration of the lesions in rectum. Control observations were made in remaining 8 subjects (4 medical students, 4 ients admitted for repair of an inguinal nia). The colon of the normal subjects orbed Na and H_2O and secreted K. In patients h villous papilloma, Na and H_2O were secreted rates of K secretion were at least 10 times mean rate of normals. Na movement into the onic lumen was increased 5-fold, K 7-fold and 2-fold over the rate found in normals. es at which these substances moved from colon o body differed only slightly from controls. multiple polyposis, rates of net transport of K and H_2O lay within the range found in the mal group. Rates of unidirectional flux of were almost doubled; Na and K left the lumen the diseased colon 4-times more rapidly than mal and their rate of entry into the colonic en was also increased several-fold. In the ient with localized polyps, Na and H_2O were orbed at normal rates by the colon before and er resection of the polyp-bearing area of the moid colon and fulguration of the polyps in rectum. K was secreted 3-4 times more idly than in normals and this increased rate unaffected by polyp removal. Rates of directional movement of Na before and after ration did not differ significantly from mals. Unidirectional K movement into the onic lumen was increased, but rates of move- t in the opposite direction were normal. re was no appreciable alteration in rates of ransport after polyp removal.

3 PATHOLOGY OF AN EAST AFRICAN MEGACOLON.

(E.) Böhm, G. M. (U. São Paulo, zil) and B. Smith. Gut 7(6):662-665, 1966.

pathology of the intestine is described in 2 es of dilatation and hypertrophy of the gmoid colon from East Africa, occurring efly in the males of a single tribe. Material obtained from 2 male patients (one was 27 old, the other 55). In the first, the total gmoid colon was 65 cm long; the dilated part 27 cm long and 10 cm wide in its widest tion. The second sigmoid colon was 75 cm g and the dilated part 40 cm in length and 9 in its greatest diameter. In both cases latation occurred in the distal part of the gmoid colon and the rectum appeared normal. mucosa and submucosa were normal, but muscle coats were hypertrophied, especially the circular fibers. The quantity of unmyelinated nerve fiber in the intermuscular plexus was reduced compared both with the normal intestine and intestine distended behind a neoplastic obstruction. Schwann cell nuclei were large and more rounded than normal and considerably reduced in number. There was eosinophil infiltration of the plexus in places, but no other evidence of inflammatory reaction. Thick unmyelinated axons were present, but they were fragmented and occasionally swollen. The interlacing network of fine fibers was absent, except for a little axonal dust. This entity is a true megacolon, and degenerative changes in the sacral parasympathetic nerve supply may have been responsible for its development.

6224 ANO-TRANSABDOMINAL POLYPECTOMY: THREE-YEAR EXPERIENCE.

(E.) Benjamin, H. B. (Marquette U., Milwaukee, Wisc.), J. V. Herzog and B. Klamecki. Clin. Med. 74(1):39-41, 1967.

The ano-transabdominal method of polypectomy, whereby the polyp is removed from below, was used in a series of 85 patients without a single complication; in this series, 21 polyps were not palpated by the general surgeon, but were found by the proctologist. Morbidity was very low, with no more extension of hospital stay than is usual for elective major surgical intervention. This is an ideal method for use during elective surgery within the abdomen; polyps of the descending and sigmoid colon can be removed at the same time without a colotomy. The patient is much more comfortable after this technic, and feeding can be started as soon as desired. Other advantages of this method include direct visual inspection of the colon in difficult areas, direct visual inspection above the 25-cm level and discovery of polyps not detected by other diagnostic means, including X-ray technics.

6225 METACHRONOUS CARCINOMA OF THE LARGE INTESTINE AND INTESTINAL POLYPS.

(E.) Bussey, H. J. R. (St. Mark's Hosp., London), M. H. Wallace and B. C. Morson. Proc. Roy. Soc. Med. 60(3):208-210, 1967.

During a 30-yr. period (1928-1957), 3,381 patients survived operations for removal of malignant tumors of the colon or rectum; 65 were metachronous (the first cancer is followed by a second at a future date), but 12 were discarded from analysis for various reasons. The remaining 53 patients represented 1.57% of the total. The total series was divided into six 5-yr. groups; the 1928-32 group, which had been followed on the av. for 35 yr., contained slightly more than 3.5% of metachronous cancer cases. The incidence rates in the other groups fell in a fairly regular manner to 0.7% for those observed for 10 yr. The time interval between the initial and second primary cancers of the large intestine ranged from approx. 3 mo. to nearly 29 yr., with an av. of 8.5 yr.; 11 cases (20% of the total number) occurred in the first and second yr.; 31 of the 53 cases developed a second growth in the first 10 yr. after removal of the first cancer, 19 in the second 10 yr. and there were 3 more cases after 20 yr. The incidence rate showed a fairly regular rise with passage of time from 0.6% to nearly 2.0%, indicating that the longer patients survive the first operation for intestinal cancer the more likely they are to develop a second growth. None of the cases of metachronous cancer showed any association with ulcerative colitis. Approx. 50% of rectal cancers at their earliest stage arose in adenomas and villous papillomas. Data showed that a patient who had cancer associated with adenomas was twice as likely to develop a further intestinal cancer than when no polyps were initially present. There was a general tendency for the incidence rate to rise, but especially so in a group with adenomas observed for the longest time, where the incidence rate was approx. 4.5%. It is concluded that the presence of adenomatous polyps is associated with an increased liability to second carcinomas. A careful follow-up is advocated for all patients who have had operations for cancer of the large intestine.

6226 NEW TECHNICS IN THE SURGICAL TREATMENT OF HIRSCHSPRUNG'S DISEASE. (E.)

Ikeda, K. (Kyushu U. Sch. Med., Fukuoka, Japan). *Surgery* 61(4):503-508, 1967.

New technics for the treatment of congenital megacolon, consisting of a modification of Duhamel's procedure by means of an oval crushing clamp designed by the author, and a radical operation involving a Z-shaped anastomosis, are described; the latter is especially beneficial since it avoids the rectal pouch which is considered to be a major disadvantage of the Duhamel procedure. A total of 31 patients were treated, 12 with the oval crushing clamp (primary radical operation in 9, two-stage operation after colostomy in 3) and 19 with the Z-shaped anastomosis (primary radical operation in 8, 2-stage operation after colostomy in 8, recurrence after abdominal colectomy in 1 and stenosis after Duhamel-Grob operation in 2). There were 15 patients less than 1-yr.-old at operation, and 8 were less than 6 mo. old. The youngest was a 2-mo.-old child weighing 5.6 kg; this was an exceptional case since the radical operation is usually performed on those patients who are heavier than 6 kg and older than 3 mo. Of the 15 patients less than 1-yr.-old, 8 had a 1-stage procedure and 7 a 2-stage operation. Time required for the operation av. 112 min. (range, 100-135 min.); the operative time required for infants was less than that for older children. Only 5 patients were followed more than 2 yr. after the operation. There was 1 operation death (with the Z-shaped anastomosis). Early complications included mild wound infection in 1 and temporary stricture in 1 (both with the oval crushing clamp technic); late complications consisted of 1 case of mechanical ileus (in a case treated with the oval crushing clamp). Constipation and diarrh were not observed. There was no complaint of urinary incontinence since the anterior wall o the rectum remained intact.

6227 PRIMARY ADENOCARCINOMA OF THE APPENDIX. (E.)

Steinberg, M. (Louisiana State U. Sch. Med., New Orleans) an I. Cohn, Jr. *Surgery* 61(4):644-660, 1967.

An estimated 15,000 appendectomies were performed at Charity Hospital, New Orleans betwee 1942 and 1965 inclusive; the diagnosis of primary invasive adenocarcinoma of the appendix was made and appeared to be reasonable on case and slide review in only 2 patients (1 of whom had appendectomy elsewhere). In another case, coded as carcinoma *in situ*, the pathologists' opinions varied, the alternate diagnosis being villous adenoma. A fourth case is presented t illustrate certain diagnostic complications. The classification, incidence, pathophysiology treatment and prognosis of primary adenocarcin of the appendix are reviewed. A primary or secondary right hemicolectomy is recommended i all cases of this lesion, unless operative ris is prohibitive.

6228 ELECTROMYOGRAPHY IN THE MANAGEMENT C THE INCOMPETENT ANAL SPHINCTER. (E.

Haskell, B. (Jefferson Med. Coll. Hosp., Philadelphia, Pa.) and H. Rovner. *Dis. Colon Rectum* 10(2):81-84, 1967.

Patients (87) from 6-73 yr. of age with partia (perianal staining and seepage) to complete (fecal incontinence or rectal prolapse) anal incontinence underwent anal sphincter electromyography, performed by insertion of an appropriate electrode into representative quadrants of the sphincter muscle. Electrical activity at the myoneural junction was recorde on magnetic tape and photographic film and als yielded an audiovisual signal. The electrode was systematically repositioned at each site t insure wide sampling of muscle. Patients with normal electromyography (27 of 38) enjoyed successful sphincter rehabilitation and relief of symptoms as a result of galvanic stimulatio and coaching; the problem in most cases was helping the patients correctly identify contractions of the sphincter. Only 6 of 16 patients with abnormal electromyographic findings achieved satisfactory results with the training regime. Patients (5 of 7) with complete prolapse and less than 50% abnormal electromyographic samplings were successfully treated by amputative proctosigmoidectomy and postoperative sphincter rehabilitation. Patie (13 of 15) with more than 50% abnormal samplin

elderly poor-risk patients were successfully
ated by a modified Thiersch procedure per-
med by parasphincteric insertion of crimped
erial Teflon. Gracilis muscle transplant
the treatment of choice for complete
ontinence after electromyography of the
cilis muscles confirmed the degree of their
ervation. Success was obtained in 4 patients
s than 50 yr. of age; in 6 patients over
yr. arteriosclerotic changes prevented
ntenance of the transplant.

9 TECHNIC OF RETROGRADE COLONIC INTUBATION AND ITS INITIAL APPLICATION TO
H BIOPSY. (E.) Fox, J. A. (Roy. Free Hosp.,
don) and L. Kreel. Gut 8(1):77-82, 1967.

the 17 intubations, 5 were conducted using
ventional screening while the remaining 12
e carried out with the help of television
itoring. Biopsies were attempted in the
ter group, however only 11 cases proved
cessful. No episodes of hemorrhage or
udoperforation were seen in this series. The
unsuccessful biopsy resulted from inter-
ence of the biopsy apparatus by simultaneous
enema examination. In another case, the
on tube was improperly positioned resulting
biopsy of normal instead of pathological
sue. The colon tube is described in detail.
h colonic biopsy was reserved for in-patients
no sedative medication was employed unless
patient manifested anxiety. Following
sage of a sigmoidoscope to as high a level
possible, the colon tube is inserted into the
moidoscope. The sigmoidoscope is withdrawn
ving the tube in place. Care should be taken
prevent protrusion of the nylon stilette
ond the leading end of the colon tube, so as
preclude perforation. The colon tube is
sed to the desired level, the stilette and
iece are then withdrawn and the suction
psy tube inserted. Further biopsies can be
omplished at different levels by gradual with-
wal of the colon tube, thus providing a
posite picture of any colonic pathology.

0 COMPLICATIONS OF COLOSTOMY IN INFANTS AND YOUNG CHILDREN. (E.) Hartford,
E. (U. Iowa Coll. Med., Iowa City) and R. T.
er. J. Iowa Med. Soc. 57(13):229-232, 1967.

ostomies (23) were performed on 19 young
ients (15 boys, 4 girls), 9 of whom were less
n 1 yr. of age; the operation was done twice
4 cases. A total of 16 patients had colonic
nglionosis, while 3 had anomalies of the anus
l rectum. Loop transverse colostomy was done
12 patients. There were 5 deaths; all
urred within 4 days of operation. Of these,
ere moribund at celiotomy; 3 had severe
l/or multiple congenital anomalies and 1 with
nglionosis had perforation of the cecum and
itonitis. A fifth had Hirschsprung's
ease and died of peritonitis. Among 14
survivors, 12 of 19 had complications related to their colostomies; surgical treatment of the complication was required in 4 cases. Complications that required surgical treatment included colonic fistula, intussusception, intestinal obstruction and closure of the afferent loop. Those which did not require surgical treatment included hemorrhage (1), wound infection (2), intestinal prolapse (5) and pericolostomy skin irritation (7).

6231 CONTRIBUTION OF ENDOBIOPSY TO THE STUDY OF LATE ALTERATIONS OF THE RECTOCOLIC MUCOSA AFTER ROENTGEN THERAPY. (Rum.) Strat, C. (2nd Med. Clin., Iasi, Rumania), L. Wasserman, A. Boingeanu, E. Miron and V. Strat. Med. Intern. (Bucur.) 18(9):1039-1047, 1966.

In 24 patients with colorectitis ascribed to irradiation 2 mo.-2 yr. earlier for cancer of the uterine cervix, endobiopsy revealed regressive lesions of the mucosa of the covering epithelium and crypts, marked by disappearance of the mucosecretory cells and the appearance of conspicuous metaplasia. These findings were accompanied by dystrophic lesions of the smooth muscle fibers and of the muscularis mucosae, arteriosclerosis, venous insufficiency, and lymphostasis with hyalinization of the lumina and thrombosis of the lymph vessels. As these lesions progress, interstitial sclerosis develops. The gravity of these lesions, some of which must be regarded as precancerous changes, calls for periodic clinical and morphologic checkups of rectal disorders in irradiated patients.

6232 PERFORATION OF THE TRANSVERSE COLON FOLLOWING EXTERNAL CARDIAC MASSAGE. (E.) Tobias, S. (Hahnemann Med. Coll., Philadelphia, Pa.) Arch. Surg. (Chicago) 94(3): 335-336, 1967.

6233 PERFORATION OF THE COLON--A HAZARD OF COLOSTOMY IRRIGATION: REPORT OF FOUR CASES. (E.) Meeker, W. R., Jr. (Roswell Park Mem. Inst., Buffalo, N. Y.), A. Mittelman and J. T. Grace, Jr. Dis. Colon Rectum 10(2): 146-149, 1967.

6234 COLOSTOMY PERFORATION: REPORT OF FOUR CASES. (E.) Marino, A. W. M., Jr. (Brooklyn-Cumberland Med. Ctr., N. Y.) and A. W. M. Marino. Dis. Colon Rectum 10(2): 103-106, 1967.

6235 TREATMENT OF PAIN POSTOPERATIVELY IN PATIENTS HAVING ANORECTAL SURGERY BY MEANS OF INTRAVENOUS LIDOCAINE. CLINICAL RESULTS. (It.) Caminiti, G. (U. Rome) and E. Boccaletti. Minerva Anest. 33(3):214-216, 1967.

6236 CANCER OF BAIRHIN'S VALVE. REPORT OF 2 CASES. (Fr.) Thys, O. (25 Ave. Moscicki, Brussels), L. Engelhom, C. Henrion, P. Mainguet and R. Le Cluyse. Acta Gastroent. Belg. 30(1):91-98, 1967.

6237 CANCER OF THE RECTUM. (Fr.) Champeau, M. and P. Bruchou. J. Chir. (Paris) 93(3):273-284, 1967.

6238 COLON CANCER INHIBITION BY VIRAL WARTS. (E.) Young, H. M. (Young Found. Med. Res., La Jolla, Calif.) Surgery 61(3):382-384, 1967.

6239 IMPLANTATION IN CANCER OF THE COLON. (E.)(Rev.) Cohn, I. (Louisiana State U. Sch. Med., New Orleans). Surg. Gynec. Obstet. 124(3):501-508, 1967.

6240 SQUAMOUS-CELL CARCINOMA OF THE ANAL CANAL AND ANUS: CURRENT STATUS OF THERAPY. (E.)(Rev.) Hightower, B. M. (Mayo Grad. Sch. Med., Rochester, Minn.) and E. S. Judd. Mayo Clin. Proc. 42(5):271-275, 1967.

6241 ADENOCARCINOMA OF THE COLON AND RECTUM IN PERSONS UNDER THIRTY YEARS OF AGE. (E.) Miller F. E. (U. Iowa, Iowa City) and R. D. Liechty. Amer. J. Surg. 113(4):507-510, 1967.

6242 RADIOLOGIC ASPECTS OF INTESTINAL LYMPHOBLASTOMA IN CHILDHOOD. (It.) Schiavetti, E. (Child. Hosp., Milan, Italy). Radiol. Prat. (Palermo) 16(5):385-397, 1966.

6243 ORIGIN AND METHOD OF APPEARANCE OF RECTOSIGMOIDAL CANCER. ROLE OF PRECANCEROUS CONDITIONS. (Fr.) Potet, F. (Fac. Med., Paris) and J. Soullard. Monde Med. 76(1041):1185-1195, 1966.

6244 CANCER OF THE RECTUM ASSOCIATED WITH MALIGNANT NEOPLASMS OF OTHER ORGANS. (Rus.) Skibenko, N. V. (Kiev Med. Inst., USSR). Klin. Khir. (Kiev) (2):33-35, 1967.

6245 CARCINOMA OF THE RIGHT COLON. (E.) Ponka, J. L. (Henry Ford Hosp., Detroit, Mich.) and J. K. Welborn. Henry Ford Hosp. Med. Bull. 15(1):49-56, 1967.

6246 LYMPHOGRAPHY IN THE DIAGNOSIS OF TUMORS OF THE RECTUM AND COLON. (Ser.) Dimković, D. (Novi Sad Hosp., Yugoslavia) and D. Terzić. Srpski Arh. Celok. Lek. 94(10):893-899, 1966.

6247 CLINICAL EVALUATION OF 396 PATIENTS WITH ADENOCARCINOMA OF THE COLON AND RECTUM. (E.) Waugh, D. E. (Tripler Gen. Hosp. Hawaii). Milit. Med. 132(5):354-359, 1967.

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6280 RECTOSIGMOID ASPECTS OF SCHISTOSOMI MANSONI. (Sp.) Vasconcellos, D. (Fac. Med., Recife, Brazil), P. DePaula Lopes A. Galdino and A. Cherpack. G.E.N. 21(2): 115-122, 1966.

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See also abstract nos.: 5634,5650,5842

OBSERVATIONS ON THE ABSORPTION OF ORAL
BETAMETHASONE 17-VALERATE AND ITS
APEUTIC VALUE IN ULCERATIVE COLITIS. (E.)
dman, M. (Univ. Coll. Hosp., London), J.
cher, J. M. Hinton, J. E. Lennard-Jones,
. Misiewicz and J. A. Parrish. Brit. Med.
(5536):335-337, 1967.

methasone 17-valerate was thought to be an
ctive treatment for ulcerative colitis
h causes neither adrenal suppression nor
r steroid side-effects. However, adrenal
ression (plasma cortisol levels less than
/100 ml) occurred in all of 6 normal sub-
s who were admin. 8 or 12 mg/day of the
p.o., thus showing that absorption did not
r. In a clinical study of 27 patients with
cute attack of ulcerative colitis, 17 were
n either 4 mg or 8 mg of the drug/day; only
17 showed improvement. Of 10 patients in
adrenal suppression was studied and who
given 8 mg/day, 3 improved, but none of
e were in complete remission at 4 wk.;
nal suppression occurred in 3 of 10 patients.
7 who did not improve on betamethasone 17-
erate all subsequently improved on
lnisone (30 mg/day, p.o.) or on sulfasalazine
.) and prednisolone-21-phosphate retention
nas. It is concluded that betamethasone 17-
rate (p.o.) is not a satisfactory treatment
ulcerative colitis in the dose used in this
dy.

3 MODERATE RECTAL FREEZING IN THE TREAT-
MENT OF HEMORRHAGIC RECTOCOLITIS.
LTS IN 13 PATIENTS. (Fr.) Debray, C.
chat Hosp., Paris) and F. Besançon. Sem.
. 43(1):17-19, 1967.

tal freezing was performed on 19 occasions in
patients with recurrent rectocolitis (4
ients underwent 2 procedures and 1 was
ated 3 times), without interruption of cur-
t medical therapy (not described). One
ient was not evaluable at the time of report;
ailed to respond and 2 later developed
urrences (1 immediately, the other after a
d response). The other 15 courses induced
ked and very rapid improvement. Particularly
d responses were noted in 5 patients (under-
ng 7 procedures); 3 of these patients had
n scheduled for surgery, but showed such
ked improvement after rectal freezing that
orectal anastomosis was no longer required.
patient treated 3 times showed marked im-
vement after each procedure. Gastroscopic
dings were also markedly improved. The
ation of remissions was no longer than that
spontaneous remissions; 3 patients remained
remission after about 5 mo. and the others
apsed after 1-9 mo. (av. 5 mo.).

4 EXPERIMENTAL PRODUCTION OF HEMORRHAGIC
ULCERATIVE COLITIS WITH AUTOANTIBODIES.
(Fr.) Oriol Palou, R. (Broussais Hosp., Paris), B. Halpern, A. Zweibaum, J. C. Morard, C. Veyre and A. Abadie. Med. Hyg. (Geneve) 25(763): 62-64, 1967.

In Wistar rats, intraplantar admin. of antigen from canine colon mucosa (corresponding to 25 mg fresh tissue in an equal vol. of Freund's adjuvant; 2 inj. at a 10-day interval) led to the development of hemorrhagic ulcerative colitis. Specific autoantibodies (anti-A) developed in the serum, reaching max. levels after 17 days and decreasing to nearly zero after about 4 mo. The syndrome, confined to the colon, included hemorrhagic ulcerations of the colon mucosa and chronic clinical signs (diarrhea and hemorrhage) which fluctuated in severity over several mo.; it was nearly identical to the ulcerative colitis syndrome in man. Treatment with homologous colon tissue or Freund's adjuvant alone did not induce this syndrome.

6285 LIVER IN ULCERATIVE COLITIS: OBSTRUCTIVE JAUNDICE DUE TO BILE DUCT CARCINOMA. (E.) Rankin, J. G. (U. Melbourne, Australia), A. P. Skyring and S. J. M. Goulston. Gut 7(5):433-437, 1966.

In a series of 441 patients with ulcerative colitis, 3 patients (2 women, 1 man) had bile duct carcinoma. In the same series, pericholangitis, which occurred in 26 patients, was the most common significant hepatic lesion. The frequency of the association of ulcerative colitis and bile duct cancer in this and other series suggests a specific relationship, the basis of which is still undetermined. Two of the patients died from cancer of the bile ducts at the unusually early age of 22 yr. The 3 patients had suffered from colitis for 10-14 yr. before clinical evidence of bile duct cancer occurred; in 2 cases clinical evidence of tumor appeared 9 and 18 mo., resp., after colectomy. In 2 patients the lesion was situated at the lower end of the common hepatic duct, while the third patient had an intrahepatic cholangiocarcinoma arising from the right hepatic duct. The association of the 2 diseases may be genetically determined, or bile duct carcinoma may be a complication of ulcerative colitis and may possibly be related to the inflammatory changes found in the biliary epithelium of many patients with the latter disease.

6286 EARLY ULCERATIVE COLITIS IN CHILDREN AND ADOLESCENTS. (E.) Brahme, F. (Indiana U. Med. Ctr., Indianapolis). Dis. Colon Rectum 10(2):136-140, 1967.

Roentgenologic changes in the early stages of ulcerative colitis in 45 patients less than 20 yr. of age (32 were less than 15 yr. old; 10

were 10 yr. old or younger) are described; 5 patients were examined within 14 days after onset of symptoms, and 32 were examined within 3 mo. In almost all patients less than 15 yr. old, lesions were equally severe in all the involved segments of the colon; in patients 15-20 yr. old, lesions were generally much more marked in the rectum and left half of the colon and faded as they extended cephalad. In 29 of 32 patients mucosal lesions initially affected the entire colon; in only 3 patients were lesions confined to the rectum. In patients from 16-20 yr. old, lesions were confined to the rectum in 4 patients, and in 6 they were limited to the rectum and sigmoid flexure. In only 3 of 13 patients of this group were the entire colon and rectum involved. In 12 of 32 patients less than 15 yr. old, ulcers healed, leaving a completely normal colon except for the obliterated folds of Kohlrausch. Strictures developed in 4, but deep undermining ulcers were not seen in this group. No cancer was encountered in this series. In patients older than 15 yr., changes were mainly confined to the left half of the colon; in 2, deep ulcers and pseudopolyposis developed. Three had changes in the rectum and entire colon, similar to those seen in the younger group, and in 2 the lesions healed completely. All patients in this group also had lesions in the rectum. In 29 of 32 cases, a juvenile type of distribution of lesions was found; the adult type of distribution (localized mainly in the rectum and sigmoid flexure) began at approx. 15 yr. of age. Healing of extensive lesions was observed, and prognosis was not related to th initial extent of the disease.

6287 HYPOGAMMAGLOBULINEMIA, THYMOMA AND ULCERATIVE COLITIS. (E.) Kirk, B. (McGill U. Med. Clin., Montreal, Quebec) and S. O. Freedman. *Canad. Med. Ass. J.* 96(18): 1272-1277, 1967.

6288 USE OF GERANYL FARNESYLACETATE IN PATIENTS WITH NONSPECIFIC ULCERATIV COLITIS. (Por.) Vilela, M. P. (Sao Paulo Hosp., Brazil) and M. Mincis. *Hospital* (*Rio*) 71(3):691-696, 1967.

6289 HOW GREAT IS THE RISK OF COLONIC CANCER IN ULCERATIVE COLITIS? (Ger Henning, N. (Fichtestr. 7, Erlangen, Germany) *Deutsch. Med. Wschr.* 92(15):721-722, 1967.

6290 SOME DISEASES ASSOCIATED WITH ULCERATIVE COLITIS: COMPLICATIONS COINCIDENCES. (Fr.) Waridel, D. (Surg. U. Lausanne, Switzerland). *Schweiz. Med. Wschr.* 97(16):514-519, 1967.

6291 TOTAL COLECTOMY WITH IMMEDIATE ILEORECTOANASTOMOSIS IN THE SURGICA TREATMENT OF ULCERATIVE COLITIS. (It.) Nico E. (Galliera Hosp., Genoa, Italy) and G. Vent *Rass. Arch. Chir.* (*Genova*) 4(6):285-318, 1966

A TEN-YEAR EXPERIENCE WITH CARCINOMA
OF THE PANCREAS. A COOPERATIVE STUDY.
Foster, J. H. (Hartford Hosp., Conn.).
. Surg. (Chicago) 94(3):322-325, 1967.

a 10-yr. period (January 1, 1955-December
1964) a total of 564 patients with proven
inoma of the pancreas were treated in 7
ral hospitals in Portland, Oregon. A total
60 patients (82%) had histologic confirma-
of the diagnosis of pancreatic carcinoma at
rotomy or at autopsy. Excluding those at
Veterans Admin. Hospital, 62% of the
ents were male. In total, 27 (5%) under-
resection, with an av. survival of 18.1 mo.
operative mortality of 22%; 248 underwent
ss, with an av. of 5.4 mo. survival and an
ative mortality of 18%, while 194 underwent
rotomy, without bypass or resection, with a
. av. survival time and a 25% operative
ality. Only 2 patients survived resection
than 5 yr. without evidence of tumor, but
other 19 patients who underwent resection
d an av. of 15 mo. which was 3 times the
ival time of patients who had undergone
ssing operations without resection. It is
luded that resection should be done
equently for pancreatic carcinoma and then
when the most favorable circumstances
t; nevertheless, significant palliation can
chieved in this group and the disease will
ermanently eradicated in an occasional
ent.

3 CARCINOMA OF THE PANCREAS. A
STATISTICAL, CLINICAL AND PATHOLOGICAL
Y. (E.) Klintrup, H.-E. (Univ. Cent. Hosp.,
inki, Finland). Acta Chir. Scand.
Suppl. 362):1-96, 1966.

incidence, clinical characteristics, surgical
tment, structure and mode of growth of
reatic carcinoma are discussed; material
uded 1,556 cases of pancreatic carcinoma
rted to the Finnish Cancer Register during
-60; 191 cases treated during 1952-63 at the
ersity Central Hospital, Helsinki (117 men,
omen; av. age was 53.5 yr.; surgery,
ormed on 179, included 23 radical, 109
iative and 47 exploratory; in 72% of the
s the diagnosis was verified histologically);
94 cases found in 5,666 autopsies during
-63. Annual incidence in 1954-60 av. 5.2
cases/100,000. An av. of 250 new cases
diagnosed annually, 20-25 of which were
inomas of the papilla of Vater. The disease
twice as frequent among men, but in older
groups the percentage increased among women.
number of cases diagnosed, and their degree
erification, was greater in cities than in
countryside. Radical surgery, performed on
was not curative. After palliative surgery,
ormed in 33% of the cases, mortality rate
ng the first yr. was distinctly, and in the second yr. slightly, lower than among untreated patients. Five-yr. survivals among the 1,556 Cancer Register cases numbered 34; 2 had been treated with radical and 17 with palliative surgery, while 15 had no treatment. Histological verification existed in 9 cases. Wt. loss was seen in 73% of the cases; pain was associated with 25% of tumors of the papilla of Vater, 59% of those of the head of the pancreas, and 84% of those of the body and tail of the pancreas. Jaundice was present in 100% of the tumors of the papilla of Vater, 84% of those of the head and 18% of those of the body. Painless jaundice occurred in 34% of all cases, and a positive Courvoisier sign in 16%. Duration of symptoms before surgery av. 5 mo., and for those treated with radical surgery, 2.8 mo. Diabetic metabolism occurred in 10% of the clinical series, and in 12% of autopsies. Venous thrombosis was infrequent in the clinical series and occurred in 19% of the autopsy material. Cholelithiasis occurred in 20% of the cases. Diagnosis was made chiefly during surgery by palpation. Eleven percent of the cases were eligible for radical surgery; mortality of radical operations in 23 patients was 9%; postoperative morbidity was 30%. Mortality was 17% for palliative operation. Pancreatico-duodenal resection was the primary form of treatment for cancer in the pancreatico-duodenal region; cancer of the papilla of Vater was the main criterion. Altogether, 75% of the tumors were located in the head of the pancreas; by histological type, 62% were ductal, 16% acinar and 22% intermediate. Characteristic growth was by local infiltration, especially into retropancreatic tissue. Inoperability was due to infiltration in 90% of the cases in which symptoms had a duration of 3 mo. or less. Metastases were found, especially in the peritoneum, liver and regional lymph nodes. No macroscopic metastases were seen in 23% of the autopsies. Perineural infiltration typical of pancreatic carcinoma was noted in 61% of the cases. No conclusive correlation was demonstrable between histological type and degree of malignancy, on the one hand, and local infiltration, metastases and perineural infiltration, on the other. Carcinomas of the papilla of Vater showed a slower growth and a lower incidence of infiltration and metastases; they contained the highest percentage of operable cases and the av. survival period was longer than in carcinoma of the pancreas, even after palliative surgery.

6294 EVALUATION OF PALLIATIVE OPERATIONS
FOR CARCINOMA OF THE PANCREAS. (E.)
Bufkin, W. J., P. E. Smith (U. Miami Sch. Med.,
Fla.) and E. T. Krementz. Arch. Surg. (Chicago)
94(2):240-242, 1967.

Of 26,087 patients treated for neoplastic diseases at the New Orleans Charity Hospital from January 1, 1948 to December 31, 1963, 600 (2.3%) were treated for cancer of the head of the pancreas; 157 of these had disease requiring a palliative operation for bypass of the obstructed common bile duct. In 149 (95%), the gallbladder was anastomosed to either the stomach, duodenum or jejunum; in 8 (5%) the common bile duct was used. Of 157 patients, 25 (16%) died in the hospital. Av. survival time for patients treated with some type of bypass operation was 4.7 mo., while av. survival time of patients with cancer of the head of the pancreas, in this series, was 3.2 mo.; patients discharged from the hospital lived an av. of 5.3 mo. A total of 80 patients (54%) had biochemical evidence of a fall in serum bilirubin; the av. fall was 11.0 mg/100 ml. Loop cholecystojejunostomy was used most frequently (78%); 25% of the patients who had loop jejunostomy bypass operations had a concomitant jejunojejunostomy distal to the primary anastomosis. Prophylactic or therapeutic gastrojejunostomy was done on 15 patients to offset concomitant or imminent duodenal obstruction. Of the patients who received a bypass operation using the gallbladder, 85% were discharged; only 63% of those receiving a bypass operation using the common bile duct were discharged. Of those receiving bypass operations using the gallbladder, 83% showed clinical improvement, but only 50% of those receiving bypass using the common bile duct showed improvement. Twenty-one patients (62%) who had a Roux-en-Y operation improved, but there was a greater decrease in serum bilirubin after this operation. Some complications during or after operation occurred in 31 patients (20%) who received bypass operation; these included psychosis, azotemia, shock, wound infection, pneumonia, alkalosis, acute renal failure and gastrointestinal hemorrhage. Most patients lived less than 3 mo., but 2 survived 23 mo. and 36 mo., resp. It is concluded that simple loop cholecystojejunostomy has the lowest operative fatality and produces the greatest percentage of clinically improved patients.

6295 PSEUDOCYST OF THE PANCREAS. REPORT OF FIVE CASES AND REVIEW OF LITERATURE.

(E.) Wool, G. (St. Louis Children's Hosp., Mo.) and D. Goldring. J. Pediat. 70(4):586-594, 1967.

Five patients (4 female, 1 male; 19 mo.-6 yr. old) with pseudocyst of the pancreas were treated at the St. Louis Children's Hospital during the last 45 yr.; a review of the literature disclosed that only 47 other cases had been reported during the last 57 yr. A review of the literature which is presented includes a discussion of the age, sex, histology, etiology, pathogenesis, laboratory findings, signs and symptoms, differential diagnosis and treatment of pancreatic pseudocyst. There was a history of preceding trauma in 54% of the 52 cases, and a history of antecedent infection in 25% of the cases. Significant anemia occurred in 2 of the 5 children reported herein, and serum amylase
levels were elevated in 3 of 5. Treatment of
pseudocyst is surgical, including cystogastro
tomy, cystojejunostomy and cystoduodenostomy;
internal drainage is associated with the best
results. In the 5 cases reported, the 3 earl
ones had excision or external drainage of the
pseudocyst, while the 2 recent cases had cyst
gastrostomies. With proper treatment, progno
is considered to be excellent.

6296 STUDIES ON THE CONTENT OF ELASTASE
THE PANCREATIC SECRETION TEST. (Ge

Schoenemann, J. (U. Rostock, Germany). Deuts
Z. Verdau. Stoffwechselkr. 26(3):129-133, 196

The conc. of pancreatic enzymes, amylase,
trypsin elastase and proelastase were determined in the duodenal fluid of 11 fasting
patients; a duodenal intubation with double
balloons was used to obtain the duodenal jui
fraction A, after s.c. inj. of 15 mg mecholy
after aspiration of a 10 min. fraction 75 U
secretin were inj. i.v. Further fractions w
obtained 20, 40, 60, and 80 min. after admin
of methacholine (mecholyl). Proelastase and
elastase conc. were measured by a photometri
method as U/ml of duodenal juice. Proelasta
of the gland and in fresh pancreatic juice i
rapidly converted to elastase by trypsin.
Amylase and trypsin were determined by
conventional methods. In the normal subject
the conc. of elastin, trypsin and amylase we
parallel in the fractions taken up to 40 min
and still quite close in the following fract
In pernicious anemia the conc. of trypsin an
elastase varied in the same manner whereas t
amylase conc. was markedly increased; this
situation also was obtained in chronic pancr
although the amylase conc. was only moderate
elevated. The conc. of bicarbonate was also
measured in the samples of duodenal juice;
bicarbonate was elevated to the greatest deg
in pernicious anemia after the inj. of secre
reaching a conc. of twice the normal.

6297 EXPERIMENTAL REFLUX PANCREATOGRAPH
AND CHOLANGIOGRAPHY. (E.) Waldro

R. L. II (Columbia-Presbyterian Med. Ctr.,
New York City), D. G. Bragg, W. J. Daly and
W. B. Seaman. Radiology 88(2):357-360, 1967

Intraluminal balloons were placed operativel
into each of 7 different adult mongrel dogs
both sexes. In this way, the duodenal segme
containing the openings of the biliary and
pancreatic ducts was isolated. The isolated
loop was filled with 50% Hypaque in an effor
to attain reflux through the openings of the
biliary and pancreatic duct systems. Using
pressure alone, no reflux occurred. Reflux
occur after 250-500 mg aminophylline was inj
i.v. and 1% Xylocaine was instilled into the
isolated loop for a period of 15-20 min. an
then withdrawn. In 5 dogs, reflux occurred
through the biliary duct opening and in 2 d
of the 5 it occurred through the pancreatic
duct. In 2 dogs, no reflux occurred because

iliary duct opening was found to be tly occluded by the proximal balloon. er Xylocaine nor the aminophylline alone ced any reflux. It is suggested that this ic will be of significant value in attain- irect pancreatography and may possibly be er approach to cholangiography.

MILD SECONDARY PANCREATIC INSUFFICIENCY IN THE INFANT. (It.) Mastella, G. andri Child. Hosp., Verona, Italy), G. glino and G. Buffatti. Fracastoro 59(6): 01, 1966.

PNEUMOPLEURAL COMPLICATIONS OF PANCREATIC DISEASES. (Fr.) Malaisse, . Hosp. St. Pierre, Brussels), J. P. Thys . Jacobs. Acta Gastroent. Belg. 39(1): , 1967.

PANCREATIC PSEUDOCYSTS: DELAYED VERSUS IMMEDIATE TREATMENT. (E.) li, J. (U. Colorado Sch. Med., Denver) and Faris. Surgery 61(4):541-543, 1967.

6301 MAJOR ARTERIAL INVOLVEMENT BY PANCREATIC PSEUDOCYSTS. (E.) Kadell, B. M. (UCLA Ctr. Health Sci., Los Angeles, Calif.) and J. M. Riley. Amer. J. Roentgen. 99(3): 632-636, 1967.

6302 USE OF MECHANICAL TANTALUM SUTURE IN RESECTIONS OF THE PANCREAS. (Rus.) Muzyka, K. A. (Lugansk Med. Inst., USSR), N. A. Shor and I. A. Enenko. Klin. Khir. (Kiev) (3): 33-36, 1967.

6303 DUODENAL STENOSIS BY ANNULAR PANCREAS IN THE NEWBORN AND NURSLING. (Fr.) Ingelrans, P., M. Lacheretz, P. Debeugny, P. Saint Aubert and E. Fievez. Lille Chir. 21(6): 346-359, 1966.

6304 ULTRASTRUCTURAL ASPECTS OF THE EXOCRINE PANCREAS AFTER SENSITIZATION AND CHALLENGING INJECTIONS OF FERRITIN (EXPERIMENTAL STUDY). (It.) Fontana, G. (U. Bologna, Italy), G. Gasbarrini and F. Faggioli. Arch. Ital. Mal. Appar. Dig. 33(2):220-224, 1966.

See also abstract nos.: 5630,5636,5722,5726,5727,5729,5730,5731,5732,5761,5849,6566

6305 ACUTE PANCREATIC NECROSIS INDUCED BY PUROMYCIN. (E.) Longnecker, D. S. (U. Pittsburgh Sch. Med., Pa.) and E. Farber. Lab. Invest. 16(3):321-329, 1967.

Rats developed patchy necrosis of pancreatic acinar cells after treatment with puromycin for periods of from 4-8 hr. Generally the degree of acinar cell necrosis was proportional to the dosage level of puromycin in the range of 5-40 mg/kg/hr. A definite, but incomplete, inhibition of incorporation of ^{14}C-leucine into pancreatic protein occurred in rats treated with puromycin at 20 mg/kg/hr. At higher doses of puromycin, lesions were also observed in the submaxillary salivary gland, lymphoid tissue and the gastrointestinal tract. Two hypotheses, one implicating inhibition of pancreatic protein synthesis and the other the production of peptides secondary to inhibition of protein synthesis, are proposed as possible pathogenetic mechanisms.

6306 LONGITUDINAL PANCREATICOJEJUNOSTOMY IN ALCOHOLIC PANCREATITIS. (E.) Cox, W. D. and W. J. Gillesby (145 Virginia St., Crystal Lake, Ill.). Arch. Surg. (Chicago) 94(4):469-475, 1967.

A total of 86 patients (24-55 yr. old, mean age 36 yr.; most of whom were male) with proven alcoholic pancreatitis were studied; 34 had no history of a previous attack, 10 had 1 attack and 42 had 3 or more previous attacks. Complications due to pancreatitis included shock (10), obstructive jaundice (12), diabetes mellitus (11), delirium tremens (14), steatorrhea (12), pancreatic calcification (8), pseudocyst (7), hyperlipemia (5), pneumonia (4), abscess of the lesser sac, uremia and extra-abdominal fat necrosis (2 each) and Mallory-Weiss syndrome (1). There were 13 deaths (14.3%). A total of 32 patients underwent pancreaticojejunostomy; 5 of these had previous cystogastrostomies that had closed. Complications of pancreaticojejunostomy included wound infection and fistula (3 each), and 1 each for hemorrhage, anesthetic overdose, peritonitis and subphrenic abscess. Follow-up ranged from 8-48 mo. Obstructive jaundice was relieved in 3 of 4 patients; return of pancreatic exocrine function was documented in some cases in about 6 mo., by disappearance of steatorrhea and floating stools, and by gain in wt. Four patients were rehospitalized: 2 due to acute alcoholic brain syndrome with delirium tremens, 1 with cirrhosis of the liver and one (4 times) for alcoholic gastritis and acute intoxication with no evidence of serum amylase elevation. None have abstained from imbibing alcohol. None of the 32 patients operated upon have been readmitted for a recurrent attack of pancreatitis.

6307 TRASYLOL IN ACUTE PANCREATITIS. (E.) Trapnell, J. E. (Roy. Infirm., Bristol, England), C. H. Talbot and W. M. Capper. Ame J. Dig. Dis. 12(4):409-412, 1967.

A double-blind trial was conducted in which 2 patients with acute pancreatitis received Trasylol (2,000-20,000 U) by either i.v. inj. or i.v. infusion, while a control group of 24 subjects received an equivalent vol. of sali dextran by the same routes; in both groups th av. age of the patients was 61.5 yr. Trasylo conferred no benefit; there was no significan difference in morbidity or mortality between the 2 groups. In the Trasylol-treated group there were 4 deaths. The av. duration of pa was 3.7 days and the av. duration of paralyt ileus was 5.3 days; in controls, these parameters were 2 deaths, 3.4 days and 4.0 days, resp. There is some evidence, both clinical and experimental, to suggest that a further double-blind trial of Trasylol using very mu larger doses would be valuable. It is recommended that if Trasylol is given for ac pancreatitis, at least 200,000 U/day should admin. and that a close observation be made toxic effects.

6308 THE MANAGEMENT OF SEVERE ACUTE PANCREATITIS. (E.) Louw, J. H. (Cape Town, South Africa), I. N. Marks and S. Bank. Postgrad. Med. J. 43(495):31-44, 1967

Classification of severe acute pancreatitis (42% of 584 total cases of pancreatitis) included alcoholic, biliary, miscellaneous a idiopathic with single and recurrent attacks comprising 80 and 168 cases, resp. The numb of complications (shock, 50; pleural effusio 5; gastrointestinal hemorrhage, 21; acute diabetes, 33; acute steatorrhea, 5; metastat fat necrosis, 7; abscess, 7; cyst formation, 48; duodenal obstruction, 2; and common duct obstruction, 2) based on type of pancreatiti included alcoholic (107), biliary (30), miscellaneous (24) and idiopathic (19). The mortality rate was 8.4% overall with 4.7%, 15.5%, 8.3% and 20% for alcoholic, biliary, miscellaneous and idiopathic categories, res Primary deaths (9) were attributable to simp shock (2), to shock with hemorrhage (1), wit hemorrhage and acute diabetes (1), with acut diabetes (2), with metastatic fat necrosis (with hyperlipemia (1) and to simple dissemin lupus erythematosis (1). Postoperative deat (12) were associated with laparotomy (shock, shock and hyperlipemia, 1); abscess drainage (shock, hemorrhage and sepsis, 1); abscess drainage and cholecystectomy (shock and seps 1; shock, hemorrhage and sepsis, 1); externa drainage of cyst (hemorrhage, 1; fistula an sepsis, 1); choledochotomy (hemorrhage, 3); sphincterotomy (hemorrhage, 1) and gastroenterostomy (hemorrhage, 1). Treatment consisted of conservative therapy (117); ea laparotomy (50); early laparotomy with dela

initive surgery (1); early laparotomy with
initive surgery (15); and delayed definitive
gery (5) which corresponded to 9,2,0,3,1 early
ths, resp. and 15(9%), 2(4%),0,3(20%),0, and
total deaths, resp. In the conservative
up there were 32 separate subsequent operations
complications and 6 late deaths.

9 SURGICAL INDICATIONS AND LATE RESULTS IN 90 CASES OF DIFFUSE CHRONIC AUTON-
JS PANCREATITIS. (Fr.) Salembier, Y. and
Ribet. Lyon Chir. 62(6):835-840, 1966.

90 patients undergoing surgery, 60 were
ilable for long-term follow-up (12-18 mo. in
over 2 yr. in 54); 123 surgical procedures
e performed and 28 patients underwent a
gle procedure. In general, surgery was as
servative as possible. Prolonged external
inage gave good results, especially when
tisone (25-100 mg/day) was added to the
imen; biliodigestive anastomosis was also
ective. Splanchnicectomy resulted in good
frequently only temporary responses. Caudal
createctomy (usually together with another
cedure) was performed in 9 patients, with
d results in 4 and a moderately good response
l. The response rate was much better in
ients who abstained from alcohol after treat-
t (70%) than in those who did not (35%).

0 ACUTE PANCREATITIS AFTER GASTRECTOMY.
(Fr.) Karageorgis, B. (Piree Gen.
p., Athens, Greece) and S. Milingos. Lyon
r. 62(6):862-868, 1966.

te pancreatitis developed 5-10 days after
lroth II gastrectomy in 7 of 1425 patients
42%) with duodenal (6) or gastric (1) ulcers.
4 patients the symptoms of pancreatitis were
omplicated and conservative therapy
piration, plasma, electrolyte replacement,
haneheline Banthine), antienzymes; hydro-
tisone in 1 patient) resulted in significant
rovement without the necessity for subsequent
gery. The other 3 patients showed other
ptoms (subicterus in 2) and underwent drain-
after conservative therapy failed to reverse
process completely. Two patients responded
l, but 1 patient (with a perforated ulcer
ending to the pancreas) showed pancreatic
rosis and widespread abdominal steatonecrosis
laparotomy and died 3 days later. Traumatiza-
n of the pancreas (6) or Santorini's duct (1)
responsible for the development of pan-
atitis. Technical methods to prevent this
ury are discussed.

1 HISTOCHEMICAL TOPOGRAPHY OF ACTIVE PROTEASES IN EXPERIMENTAL AUTODIGESTIVE
CREATITIS. (Ger.) Bleyl, U. (U. Heidelberg,
many), K. H. Grözinger, W. Nagel and M. Wanke.
chow. Arch. Path. Anat. 342(1):26-37, 1967.

Ten mongrel dogs had an experimental pancreatitis induced under anesthesia by the intracanalicular introduction of 6 ml of olive oil; 2-5 hr. after the application of olive oil, the animals were killed and the pancreata removed; some tissue from each gland was prepared for optical histology; some tissue was frozen and sectioned for histochemical studies using a modified fibrin substrate-film method by applying beef fibrinogen to sections treated with a thrombin preparation. These moist sections were incubated at 37°C for 10-60 min., fixed in 5% formalin, stained, and covered as usual. The moist sections were incubated without, and also with, the addition of Ca ion. The fibrin film was digested away in broad, rounded or oval areas in the regions of the intrapancreatic blood vessels, after short incubation periods (about 10 min.) without the Ca ion. When the Ca ion was present, no fibrinolysis occurred. Parallel effects were seen on longer incubation (more than 30 min.) in the pancreatic tissue and in the overlying fibrin film. This *in vitro* proteolysis seems to be the same as that occurring in autodigestive pancreatitis. The proteolytic digestion of the substrate in the parenchymal regions differed, however, from the perivascular (endothelial cell) plasmin-induced fibrinolysis by its relationship to areas of tryptic necrosis. Regions of extensive necrosis showed absence of the substrate film. The Ca ion slowed the plasminogen-activated fibrinolysis. Proteolysis was not delayed by the Ca ion in the regions of autodigestive parenchymal (tryptic) necrosis. Proteases released from tissues are important in the pathogenesis of autodigestive pancreatitis.

6312 STUDIES ON THE CARBOHYDRATE METABOLISM IN TOXIC PANCREATITIS OF RABBITS.
(Ger.) Bibergeil, H. (U. Med. Clin., Rostock, Germany). Z. Gastroent. 4(6):352-358, 1966.

The pancreatitis resulting from inj. of 3-5 ml of a standardized, diluted staphylococcus toxin under a pressure of 45-70 cm H_2O into the pancreatic duct of each of 10 rabbits (Group 3) (3.9 kg) followed by duct ligation, caused a hyperglycemia from short term (in the first 60 min. after inj.) to one lasting for several hours; after 24 hr. the blood sugar level had returned nearly to normal; postoperatively, 3 days and 5 wk. after the operation Group 3 was given prednisolone-glucose tolerance tests (1 g glucose/kg in 40% soln., 2 hr. after 2.5 mg prednisolone, i.v.); these tests were compared to those given prior to toxin inj. Eight different animals with a sham operation and pancreatic duct ligation (Group 2) and 10 animals with sham operation only (Group 1) served as controls. Group 2 had elevated blood sugar levels although not as high as Group 3. The av. serum amylase activity of Group 2 reached 3773 μg of converted starch at the end of 24 hr., exceeding Group 3 by 1118 μg. The amylase values had receded to the normal range 4 wk. after operation. The prednisolone-glucose tolerance tests given postoperatively showed an increased and prolonged blood sugar level in Groups 2 and 3 to almost the same extent, decreasing somewhat more slowly in Group 3; 3 days as well as 5 wk. after operation, all showed a normal tolerance test. After 5 wk. all animals except Group 1 developed a definite diabetes, of a lower grade in Group 2 than Group 3. The experimental results corresponded to the rapid, transitory hyperglycemia in acute pancreatitis of man and that type of permanent diabetes observed in the clinic after total necrosis of the pancreas. This was confirmed by histology.

6313 PRESENT STATUS AND SURGICAL TREATMENT OF PRIMARY CHRONIC PANCREATITIS. (Fr.) Forster, E. (Pasteur Hosp., Colmar, France), J. Muller, E. Weill and A. Wittlinger. *Strasbourg Med.* 18(2):101-111, 1967.

6314 INFLUENCE OF PARATHORMONE ON THE COURSE OF EXPERIMENTAL ACUTE HEMORRHAGIC-NECROTIC PANCREATITIS. (E.) Bernacki, E. (2nd Surg. Clin., Bialystok, Poland). *Acta Physiol. Pol.* 17(1):48-54, 1966.

6315 PRIMARY CHRONIC, RECURRENT, PARENCHYMATOUS PANCREATITIS. (Fr.) Mallet-Guy, P. (Fac. Med., Lyon, France). *Arch. Ital. Mal. Appar. Dig.* 33(4):324-338, 1966.

6316 CHANGES IN BLOOD GLOBULINS IN CHRONIC PANCREATITIS. (Fr.) Svartz, N. *Arch. Ital. Mal. Appar. Dig.* 33(4):339-340, 1966.

6317 MANAGEMENT OF PANCREATITIS. (E.)(Re
Warren, K. W. (Lahey Clin. Found., Boston, Mass.), M. C. Veidenheimer and G. A. Kune. *New York J. Med.* 67(9):1174-1180, 1967.

6318 CHRONIC RELAPSING PANCREATITIS. (E.
Marks, C. (Marquette U. Med. Sch., Milwaukee, Wisc.) *Amer. J. Surg.* 113(3):340-3
1967.

6319 PANCREATITIS AFTER ABDOMINAL SURGERY
(Rus.) Porembskiî, O. B. (Kirov Ord
of Lenin Acad., Leningrad, USSR) and L. N. Kul
Vestn. Khir. Grekov. 98(1):53-56, 1967.

6320 EARLY MANIFESTATIONS OF POSTOPERATIV
PANCREATITIS. (Rus.) Teitel'baum, I. B. (Kalinin Reg. Hosp., USSR). *Vestn. Khir*
Grekov. 98(1):56-61. 1967.

6321 TREATMENT OF ACUTE PANCREATITIS AND
PANCREAS NECROSIS. (Hun.) Rácz, I. (Hajdu-Bihar County Hosp., Hungary) and S. Tor
Orv. Hetil. 107(51):2419-2423, 1966.

6322 TREATMENT OF ACUTE EXPERIMENTAL PANCREATITIS. EXPERIENCE WITH ACETAZOLAMIDE, ENZYME INHIBITORS AND EPSILON AMINOCAPROIC ACID. (Sp.) Morel, C. J. L. (Ramos Mejia Hosp., Buenos Aires) and C. A. Linares. *Arq. Gastroent. (Sao Paulo)* 3(4): 197-208, 1966.

See also abstract nos.: 5637,5728

ACIDIFICATION OF THE DUODENUM AND
ELIMINATION OF SULFOBROMOPHTHALEIN
THE CIRCULATION. (Ger.) Benyó, I. (U.
pest, Hungary), F. Füsy, P. Görgö and M.
z. Deutsch. Z. Verdau. Stoffwechselkr.
):134-137, 1966.

ents with normal gastrointestinal function
the residual gastric juice aspirated from
fasting stomach after which 2 ml/kg of
iological saline at body temperature was
illed into the duodenum. BSP dye (5 mg/kg)
inj. in 1 cubital vein; at 3,7, and 15 min.
r dye inj., blood samples were taken from
contralateral vein and the dye conc.
rmined in the serum. The same procedure
repeated 48 hr. later, exactly, except that
% HCl (2 ml/kg) was substituted for the
iological saline. Significant differences
limination of dye was found between the 2
of tests carried out in 10 patients. The
erence was appreciable at 3 min. after dye
but became more marked at 7 and 15 min.; at
n. 26% more dye was eliminated after
ification of the duodenum and at 15 min.
ination was 59% greater after acidification.
e is no certain explanation for this effect;
transfer of the dye in the reticulo-
thelial system may be hastened. However, it
mportant that the BSP test be given in the
ing on a fasting stomach in order to
dardize the test as far as possible.

HISTOCHEMICAL STUDY OF ENZYMES IN THE
LIVER IN CHRONIC HEPATITIS AND
RHOSES OF THE LIVER. (Rus.) Gupalo, E. E.
. Pathol. Anat., Inst. Therapy, Moscow).
. Pat. 28(11):62-66, 1966.

activity of succinic dehydrogenase, cyto-
ome oxidase, nonspecific esterase, and true
ase in liver samples, collected by laparoscopy
n 19 patients suffering from cirrhosis and 9
ients with chronic hepatitis, was determined
histochemical methods and compared with the
ivity of these enzymes in liver of healthy
ividuals. The levels of succinic dehydro-
ase, cytochrome oxidase, and nonspecific
erase were markedly lower in affected than
normal livers. However, in regenerating
er cells the activity of succinic dehydro-
ase and of nonspecific esterase increased
in rapidly. On the other hand, the level of
e lipase was higher in affected than in nor-
livers. The localization of these enzymes
various cell types of affected and normal
ers is also described.

5 ELECTROPHORETIC MOBILITIES OF SERUM
γ-GLUTAMYL TRANSPEPTIDASE AND ITS
NICAL APPLICATION IN HEPATOBILIARY DISEASE.
) Rutenburg, A. M. (Beth Israel Hosp.,
Boston, Mass.), E. E. Smith and J. W. Fischbein. J. Lab. Clin. Med. 69(3):504-517, 1967.

The electrophoretic mobilities of the isoenzymic components of γ-glutamyl transpeptidase in normal serum and in the serum of 52 patients with various hepatobiliary and other diseases is described. Paper electrophoresis of normal serum separates γ-glutamyl transpeptidase into 2 fractions, one in the albumin to α_1-globulin region (GT-1) and a major one in the α_2-globulin region (GT-2). In electrophoregrams of patients with disorders affecting hepatobiliary and pancreatic systems, there was a relatively large increase in GT-1, compared to GT-2, and frequently there was an abnormal peak in the β-globulin region (GT-3). A dominant GT-3 peak was noted in patients with biliary cirrhosis secondary to choledocholithiasis or biliary atresia and in some patients with liver metastases and severe toxic hepatitis. Prognosis was usually poor when the GT-3 fraction was dominant. In patients with hepatobiliary pancreatic disease, the principal value of glutamyl transpeptidase electrophoresis is in evaluating prognosis and progress of disease and response to therapy rather than in differential diagnosis.

6326 INDOCYANINE GREEN CLEARANCE AS A TEST FOR HEPATIC FUNCTION. EVALUATION BY DICHROMATIC EAR DENSITOMETRY. (E.) Leevy, C. M. (VA Hosp., East Orange, N. J.), F. Smith, J. Longueville, G. Paumgartner and M. M. Howard. J.A.M.A. 200(3):236-240, 1967.

Clinical evaluation of liver function was facilitated by use of dichromatic ear densitometry to study the clearance of indocyanine green; densitometry provides an accurate index to arterial levels of this dye. Hepatic clearance studies were obtained in 10 healthy adult subjects (25-60 yr. old) who had histologic evidence of a normal liver and 49 patients in the same age group with biopsy evidence of liver disease (10 fatty liver, 11 viral hepatitis, 18 Laennec's cirrhosis, 3 postnecrotic cirrhosis, 4 cancer metastases to the liver and 3 extrahepatic biliary obstruction); 0.5 mg and 5.0 mg of indocyanine green/kg body wt. were used. Sequential clearance studies in the same patient with increasing doses of the dye showed that patients with mild liver injury could be differentiated from those with normal liver. Subjects with normal removal of both 0.5 and 5.0 mg of the dye had normal results of liver histology or hepatic infiltrative lesions such as fat or metastatic cancer not associated with other morphological evidence of liver-cell damage. Those with normal removal of 0.5 mg/kg and abnormal removal of 5 mg/kg had evidence of liver-cell damage or necrosis on biopsy; this was associated with fatty liver, mild cirrhosis, metastatic cancer, early-phase cholestasis or viral hepatitis. Patients with abnormal removal at both low and high dose levels consisted of patients with marked fatty liver, acute hepatitis, moderate to severe cirrhosis and late phases of biliary obstruction or cancer metastases to the liver. Removal of the large dose was abnormal in patients with histologic evidence of mild fatty liver (4 patients) or persistent mild hepatitis (3 patients) in whom serum total bilirubin level, SGPT and 45-min. BSP retention were normal. Clearance capacity for 5 mg indocyanine green/kg body wt. returned to normal later than either SGPT or BSP retention in 3 patients with active viral hepatitis studied serially. Long-term studies in patients with Laennec's cirrhosis or postnecrotic cirrhosis showed an increase in dye clearance with improvement in histopathology and deterioration in dye-removal capacity with morphological evidence of further liver-cell destruction. It is concluded that serial study of indocyanine clearance reflects improvement or deterioration in liver histopathology and is valuable in following the course of both acute and chronic liver injury.

6327 CONTINUOUS INDOCYANINE GREEN DISAPPEARANCE CURVES AS A ROUTINE LIVER FUNCTION TEST. (Fr.) Platteborse, R. (Saint Gilles Hosp., Brussels, Belgium), M. Clausse and C. Tenzer. Acta Gastroent. Belg. 29(10):831-846, 1966.

In 26 normal adults, the av. blood clearance of indocyanine green was 6 min. 2 sec., and av. values for arm-ear and ear-ear circulation were 10.58 and 18.80 sec., resp. BSP clearance was normal in all cases. In patients with various liver diseases (hepatitis, cirrhosis, steatosis, alcoholism, choledocholithiasis, post-hepatitis convalescence, liver metastases from various tumors), elevated BSP retention was associated with abnormal indocyanine green clearance in 22 of 28 cases; BSP levels were elevated but indocyanine green clearance was normal in 4 cases, while the reverse was true in 2 cases. None of these patients had circulatory diseases. In 26 patients with various cardiovascular diseases, the results of the 2 tests varied widely in 10 of 20 tests in patients with indocyanine green clearance of 12 sec. or over. It is suggested that the disturbances in BSP clearance in these patients resulted from extrahepatic retention or metabolism of BSP, and that the indocyanine green clearance test can serve as a method of detecting causes of error in hepatic dye-transit tests.

6328 SERUM PROTEIN IMMUNOELECTROPHORESIS IN CHRONIC LIVER DISEASES. (Fr.) Fronesci, E. (Med. Clin. & Polyclin., Bucharest, Rumania), E. Almasan and R. Tudor. Acta Gastroent. Belg. 29(10):870-878, 1966.

Of 41 patients with chronic hepatitis or cirrhosis of nonalcoholic origin, 87% showed simultaneous elevation of the γ- and α_2-globulin; the γ_1M-fraction was elevated in 70% and the γ_2-fraction in 60%. In the β-globulin fraction only the β_1A-fraction was depressed; a decrease in the α_2-fraction haptoglobin was noted in 28% In chronic hepatitis the characteristic change was an increase in γ_1M-globulin; in cirrhosis the γ_2-fraction (indicating a reaction to sclerosis) was elevated. Changes in γ_1M-globulin were parallel to those of the thymol turbidity test. The only protein considered a relatively constant measure of liver insufficiency was the Schultze seromucoid α_1.

6329 VALUE OF DETERMINATION OF ORNITHINE-CARBAMYL TRANSFERASE (OCT) IN LIVER DISEASES. DESCRIPTION OF A PERSONAL METHOD AND PRELIMINARY RESULTS. (Fr.) Rottiers, R. (Stat U., Ghent, Belgium) and L. Demeulenaere. Acta Gastroent. Belg. 29(10):821-830, 1966.

In 140 patients with jaundice resulting from hepatitis (55), cholangiopathies (38) or cirrhosis (47), serum OCT values were widely scattered, from normal (in 6, 3, and 8 cases, resp.) to extremely abnormal, in all groups. There was no relationship between serum OCT values and the type of disease. Further studies were performed in the 47 cases of cirrhosis. OCT, cholinesterase, SGOT, and SGPT values were normal in 8, 6, 2, and 15 patients, resp. Only 1 patient showed normal OCT values and elevated levels of the other enzymes, and all but 7 cases showed elevation of 3 or 4 enzymes. There was no correlation between OCT levels and levels of the other enzymes, but a good correlation between OCT levels and BSP retention values was noted in 9 of 10 cases studied. It is concluded that determination of OCT levels, being a specific test for ureogenesis, is of value in the surveillance of the evolution of cirrhosis.

6330 ORNITHINE-CARBAMYL-TRANSFERASE ACTIVITY IN THE SERUM OF HEPATOBILIAR PATIENTS. (It.) Giuditta, E. (U. Bologna, Italy) and N. Marrone. Riv. Gastroent. 17(6): 375-384, 1965.

Serum levels of ornithine-carbamyl-transferase (Demange method) were compared in 120 subjects of both sexes (age 21-45 years), of whom 80 had hepatic or biliary disease, 20 had non-hepatic diseases, and 20 were apparently health controls. Av. serum levels were 1.1 mg/0.5 ml in controls. Normal levels were observed in patients with nonhepatic diseases (gastroduodenal ulcer, gastric and intestinal carcinoma, intestinal obstruction, rectoproctitis, Crohn's disease, appendicitis, diabetes, and others), although 2 diabetic patients (1 in coma and 1 with jaundice and hepatomegaly) showed slight increase to 3 mg/0.5 ml. Highest serum levels were seen in patients with viral hepatitis with or without jaundice (11-12 mg/0.5 ml). In hepatic and biliary lithiasis,

m levels were increased only after severe
c or during the appearance of jaundice.
m levels were increased in a patient with
ary hepatic carcinoma but varied in patients
metastatic hepatic carcinoma or atrophic
hosis. It is concluded that the determina-
of serum ornithine-carbamyl-transferase
ls is a sensitive test indicating hepatic
ry.

BEHAVIOR OF PHOSPHOLIPID FRACTIONS IN
THE PLASMA OF PATIENTS WITH LIVER
ASE. (It.) Gandolfi, L. (U. Bologna, Italy),
ucci, L. Frizziero and O. Masiello. Riv.
roent. 17(6):395-409, 1965.

ma phospholipid (cephalin, lecithin,
ingomyelin, and lysolecithin) levels were
rmined by thin-layer chromatography
lified Habermann method) in 35 patients with
ous hepatic or biliary diseases. A decrease
v. plasma levels of all fractions was seen
1 patients with hepatic cirrhosis and an
ease in 4 patients with biliary cirrhosis.
gnificant increase in lecithin levels (av.
6 μg/ml) was observed in 7 patients with
ructive jaundice; increases in sphingomyelin
lysolecithin were not significant. A
ificant decrease in lysolecithin levels (av.
μg/ml) and increase in lecithin levels
56.67 μg/ml) were observed in 7 patients
acute hepatitis. Patients with hepatic
loidosis, melanosarcoma, and yellow atrophy
ved a marked decrease in lysolecithin levels;
fractions were greatly reduced in the
ient with yellow atrophy. Increased
olecithin and lecithin levels were observed
a patient with cardiac cirrhosis complicated
cholestasis. Various interpretations of
dings are discussed.

2 CHRONIC PASSIVE CONGESTION OF THE
LIVER IN MAN. ELECTRON MICROSCOPIC
DY OF CELL ATROPHY AND INTRALOBULAR FIBROSIS.
) Safran, A. P. (Mt. Sinai Sch. Med., New
k, N. Y.) and F. Schaffner. Amer. J. Path.
3):447-463, 1967.

er biopsy specimens were obtained from 3
ients with long-standing chronic passive
gestion and studied under the electron
roscope. Cells in the centrilobular zone
appeared because of atrophy, rather than
rosis. Pressure and local undernutrition
e more important than anoxia in producing
ophy. Interference with nutrition seemed to
ult from extensive fibrosis, particularly in
spaces of Disse, where blood-liver cell
hange was impaired. Fibrosis developed in
absence of necrosis, inflammation or
tular proliferation, but it was associated
h numerous fibroblasts; this indicated the
formation of fibers rather than condensation
pre-existing stroma. Canalicular dilatation
rupture were also noted, but they were
associated with cell atrophy and disruption of the liver cell plate, and not with cholestasis.

6333 CHANGES IN IMMUNE GLOBULINS IN THE COURSE OF CHRONIC HEPATITIS AND POST-HEPATITIS CIRRHOSIS (IMMUNOCHEMICAL ASPECTS, DIAGNOSTIC VALUE, AND PHYSIOPATHOLOGIC SIGNIFICANCE). (Rum.) Stoica, G. (Inst. Intern. Med., Bucharest, Rumania), V. Runcan, I. Vasiliu and C. Miron. Med. Intern. (Bucur.) 18(9):1069-1076, 1966.

Over a 3-year period, agar gel zone electrophoresis and immune electrophoresis were applied to serum protein studies on 104 subjects observed after epidemic hepatitis, 89 patients with chronic hepatitis, and 25 patients with post-hepatitis cirrhosis. Some of the findings have already been published; here the emphasis is on immune globulin changes and their clinical and physiopathologic significance within the context of the other changes in serum proteins observed during and after hepatitis. The immune electrophoresis patterns obtained were generally too similar for quantitative assessment, so only very conspicuous changes were taken into account. These included a marked increase in all 3 classes of immune globulins (especially in the γ G- and γ M-globulins) in almost all cases of chronic hepatitis and post-hepatitis cirrhosis. In contrast to certain malignant diseases, there were few instances of "dissociated," as opposed to parallel, increases, and in no case was there a decrease in any of the 3 classes. Also, a quantitative reduction in most of the α_1- and α_2-globulins was very frequently observed in severe chronic hepatitis, and almost always in post-hepatitis cirrhosis. (There was a striking contrast between the immune electrophoresis findings with respect to the α_1- and α_2-fractions and the zone electrophorogram, which usually showed an increase rather than a decrease in these fractions.) In addition to these quantitative changes, there was some evidence of qualitative changes as well, particularly in the γ M- and γ G-globulins, changes resembling those observed in Waldenström's macroglobulinemia. The diffuse nature of the hyperimmunoglobulinemia of hepatitis and the characteristic changes in the α_1- and α_2-globulins which accompany it should, however, insure against diagnostic confusion with malignant diseases of the blood and to distinguish it from other chronic inflammatory diseases (rheumatoid arthritis, lupus, etc.), in which, though the hyperimmunoglobulinemia is also diffuse, the α_1- and α_2-fractions are increased. Complete elucidation of the immunologic aspects of chronic hepatitis and post-hepatitis cirrhosis must await information about the nature of the "antiliver antibody" and the specificity of the antigens with which it reacts in serologic tests.

6334 PYOGENIC LIVER ABSCESS DUE TO MICRO-AEROPHILIC STREPTOCOCCI. (E.)

Patterson, D. K., R. S. Ozeran, G. J. Glantz, A. B. Miller and S. M. Finegold (Wadsworth VA Hosp., Los Angeles, Calif.). Ann. Surg. 165(3): 362-376, 1967.

Two cases of liver abscess due to microaerophilic streptococci are described, and 15 cases from the literature are reviewed. The true incidence of anaerobic organisms and anaerobic cocci specifically in cases of liver abscess is not known, since adequate anaerobic cultures frequently are not done. An important and often overlooked indication of anaerobic infection is putrid or foul-smelling purulent exudate. Liver photo-scanning was the most useful procedure leading to a diagnosis in the 2 cases described; it was very helpful in planning the surgical approach. Surgical drainage is the primary treatment of pyogenic liver abscess; it is best accomplished with the posterior approach in 80% of the cases. Antibiotic therapy for liver abscess in general, and for infections due to anaerobic cocci, is discussed.

6335 MODIFICATIONS OF THE BLOOD ACID-BASE EQUILIBRIUM IN HEPATIC COMA. STUDIES OF THEIR MECHANISM AND OF THE SIGNIFICANCE OF ALKALOSIS IN AMMONIA TOXICITY. (Fr.) Imler, M. (Fac. Med., Strasbourg, France), R. Bockel, W. D. Kerr, Jr. and J. Stahl. Path. Biol. (Paris) 14(23-24):1135-1144, 1966.

Respiratory alkalosis was observed during 76% of 54 episodes of hepatic precoma, in 88% of 18 episodes of hepatic coma, and in 64% of 54 patients with alcoholic cirrhosis showing no neuropsychiatric disturbances. The only factor differentiating the cirrhotic patients not in coma from precomatose patients with equivalent hyperammonemia was marked alkalosis (pH 7.5 or over), but it was not possible to differentiate comatose from precomatose stages according to the intensity of alkalosis. Metabolic alkalosis was usually not accompanied by metabolic compensation, but some patients showed metabolic compensation apparently linked with hypokalemia. Arterial hypoxemia and hyperammonemia did not seem to be the determining factors in the development of respiratory alkalosis, and alkalosis had no constant or certain beneficial effect on cerebral toxemia. Successive episodes of coma in the same patient were sometimes accompanied by about the same degree of hyperammonemia, but highly variable degrees of alkalosis.

6336 HEPATIC REPERCUSSIONS OF RESPIRATORY DISTRESS. (Fr.) Warembourg, H. (A. Calmette Hosp., Lille, France), C. Voisin, F. Guerrin, C. Wallaert, F. Wattel and B. Gosselin. Acta Gastroent. Belg. 29(12):1049-1057, 1966.

Liver function was studied in 80 emergency cases of respiratory distress; 16 patients (Group 1) were conscious with moderate hypoxia and hypercapnia, 16 showed more pronounced hypoxia and hypercapnia with some loss of consciousness (Group 2) and 48 patients had continuous CNS symptoms, decompensated hypercapnia and severe hypoxia (Group 3). Liver damage was present in nearly all cases, especially in Group 3. SGOT, SGPT, aldolase, ornithine-carbamyl transferase and LDH levels were increased in about 50% of the patients, especially in Group 3 (av. values at admission in 20 patients of Group 3 were 304, 259, 1.03, 5.8 and 1263 U, resp.). Esterified cholesterol levels were 0.8-1.2 g, but they were 0.5 g or less in some patients in Group 3 with extremely high SGOT and SGPT levels. Titers of prothrombin and the prothrombin group were over 50% in Groups 1 and 2, but below 50% in 22 patients in Group 3; coagulation factors showing particularly marked changes were Factors V and VII. Serum bilirubin and albumin levels were usually unchanged; BSP retention was abnormal i 1 of 3 cases in Group 1, 3 of 5 in Group 2, and 8 of 8 cases of Group 3 (studied at the time of admission). These liver function abnormalities were accompanied by histopathological abnormalit in 14 cases (cellular clarification and chiefly centrilobular necrosis; prolonged evolution sometimes resulted in fibrosis), but even in Group 3 the functional abnormalities regressed to normal or nearly normal after about 2 wk. of treatment. Liver damage was apparently associated only with acute respiratory decompensation of sudden onset and prolonged duration, and resembled that seen in viral or toxic hepatitis. The relationship(s) between liver function and the effects of hypoxia, hypercapnia, acidosis and, especially, secondary hemodynamic factors could not be established.

6337 LIVER MANGANESE IN HEMOCHROMATOSIS. (E.) Altstatt, L. B. (Walter Reed Army Inst. Res., Washington, D. C.), S. Pollack, M. H. Feldman, R. C. Reba and W. H. Crosby. Proc. Soc. Exp. Biol. Med. 124(2):353-355, 1967.

The conc. of Mn in liver samples from patients (20) dying with hemochromatosis was compared with the Mn conc. in liver samples from patients (20) dying of myocardial infarction. The former group were males over 35 yr. old, with liver cirrhosis, liver hemosiderosis, Fe deposition in other tissues of the body, and no history of multiple transfusions or of excess Fe ingestion; the latter group included males over 35-yr.-old, with an autopsy diagnosis of myocardial infarction, no history or autopsy findings of liver disease, no liver hemosiderosi or Fe deposition in the other tissues, and no history of excess Fe ingestion, multiple transfusions or hematologic disorders. The mean conc. of liver Mn was significantly higher in the hemochromatosis samples (4.25 μg/g dry tissue) than in liver samples free of cirrhosis and siderosis (2.13 μg/g dry tissue). A significant correlation was found between Mn and Fe content in hemochromatosis. In the age groups studied, there was no dependent relationship between age of the patient at death and Mn nc. in the liver; and in the tissues studied ere was no dependent relationship between the me the tissues were in storage and their Mn nc. It is concluded that hemochromatosis is sociated with increased liver Mn, but a causal lationship between the cirrhosis and Mn has t been established.

38 NEONATAL SERUM BILIRUBIN AND GLUCOSE-6-PHOSPHATE DEHYDROGENASE. RELATION-IP OF VARIOUS PERINATAL FACTORS TO HYPER-LIRUBINEMIA. (E.) Wolff, J. A. (630 W. 8th St., New York City), B. H. Grossman and K. ya. Amer. J. Dis. Child. 113(2):251-254, 67.

correlation was found between any one of everal perinatal factors evaluated (method of livery, complications of pregnancy and labor, dication during labor, antibiotics given, etc.) d the presence of unexplained jaundice in new-rn infants. Of 844 newborn infants, 18 (2.1%) d RBC glucose-6-phosphate dehydrogenase ficiency; all but 2 deficient subjects were of gro origin. Enzyme deficiency was not countered in any of 210 Caucasian babies. ily bilirubin values were determined for an ditional group of 119 Negro full-term male onates, in all of whom glucose-6-phosphate-hydrogenase activity was also determined. The cidence of jaundice in this series was the me in enzyme-deficient infants as in those th normal levels of RBC glucose-6-phosphate hydrogenase. For the 119 Negro full-term male wborns, the mean max. bilirubin value was 6.1 /100 ml and the mean max. bilirubin level curred at 3.3 days of age; 75% of Negro babies th bilirubin levels between 4.0 and 10.0 /100 ml did not have clinically recognizable undice. When the bilirubin level exceeded .0 mg/100 ml, almost 50% of the infants failed show a recognizable degree of jaundice.

39 BILIRUBIN NEPHROPATHY IN THE GUNN STRAIN OF RAT. (E.) Odell, G. B. Johns Hopkins U. Sch. Med., Baltimore, Md.), . C. Natzschka and G. N. B. Storey. Amer. J. ysiol. 212(4):931-938, 1967.

omozygous, jaundiced, Gunn rats were compared ith heterozygous controls for their ability to onc. urine after deprivation of water. During he last 6 hr. of a 28-hr. period of fasting and hirsting, mean urinary flow rates were 50 and 49 μliters/100 g/hr. for the heterozygous and omozygous rats, resp.; corresponding urinary smolalities were 1,909 and 815 milliosmols/kg ater. Both groups of rats excreted comparable otal solute loads, but the homozygous rats had 30% greater loss in total body wt. Losses of a in the urine of the jaundiced rats were 3 imes greater than those found for control rats. nalysis of the medullary solute composition howed that the conc. gradient for Na between he cortex and papilla in the homozygous rat was only 30 mEq/liter of tissue water. Regional analysis of the kidneys for bilirubin revealed a 100-fold greater conc. of bilirubin in the renal papilla than in the corresponding cortex. These findings suggest that bilirubin in high conc. may interfere with reabsorption of Na from the tubular fluid within the ascending limb of the loop of Henle.

6340 CONSTITUTIONAL NON-HEMOLYTIC JAUNDICE (GILBERT'S DISEASE). MORPHOLOGICAL AND FUNCTIONAL CONSIDERATIONS ON 2 CASES. (It.) Coltorti, M. (U. Naples, Italy), C. Del Vecchio-Blanco, A. Cecio and A. B. Gallo. Policlinico [Med.] 73(5):257-280, 1966.

Clinical and microscopic studies were conducted in a 13-yr.-old girl (Patient No. 1) and a 45-year-old woman (Patient No. 2) with Gilbert's disease. The Malloy-Evelyn and Eberlein tests revealed abnormally high serum bilirubin levels (almost entirely of the indirect type) in both patients, and bilirubin curve studies showed a decreased excretion of the bile pigment. However, bile pigment levels, cholangiocholecystography, laparotomy findings, routine hepatic function tests, blood tests, and RBC studies were normal in both patients. The father of Patient No. 1 had high serum bilirubin levels but to a lesser degree than the daughter; the daughter of Patient No. 2 also showed abnormal bilirubin levels. Electron microscope studies in Patient No. 1 revealed normal cell membranes but noticeable alterations of hepatocyte cytoplasm structure consisting of disruption of the endoplasmic reticulum, decrease in the number of organelles and their shift towards the perinuclear area or cell membrane. Similar studies in Patient No. 2 revealed the presence of both normal and "spongy" hepatocytes with the cell membranes of the latter type showing interruptions at the vascular pole level and consequent escape of various cytoplasm constituents into the spaces of Disse. Results suggest altered bilirubin metabolism at the level of its passage from the blood to the RBC, or at the intrahepatocyte level during transport to a conjugation site.

6341 LATE ELEVATION IN SERUM BROMSULFALEIN IN DUBIN-JOHNSON SYNDROME. A COMPARATIVE CASE STUDY. (E.) Dollinger, M. R. (Mem. Hosp. Cancer & Allied Dis., New York City) and L. L. Brandborg. Amer. J. Dig. Dis. 12(4): 413-418, 1967.

A 45-yr-old male with the Dubin-Johnson syndrome had a delayed elevation in serum BSP; this phenomenon was reported in previous patients with this syndrome. It did not occur in a patient with the closely related Rotor's syndrome, or in 4 patients with jaundice due to cirrhosis, cholangiolitic hepatitis, chronic viral hepatitis and cholestasis. This finding may be helpful in the diagnosis of the Dubin-

Johnson syndrome, especially if liver biopsy is impossible or is contraindicated; it may also assist in defining the indication for liver biopsy in family studies.

6342 ACUTE INTERMITTENT PORPHYRIA: EFFECT OF DIET AND GRISEOFULVIN. (E.) Felsher, B. F. (Walter Reed Army Inst. Res., Washington, D. C.) and A. G. Redeker. Medicine (Balt.) 46(2):217-223, 1967.

The effect of various dietary regimens and griseofulvin (2 g/day) on acute intermittent porphyria was evaluated in a group of 4 subjects which included 2 men with the disease, 1 woman with possible latent porphyria and one obese, nonporphyric male volunteer; these ranged in age from 35-47 yr. The results of this study indicated that the level of porphyrin precursor excretion in patients with acute intermittent porphyria is inversely related to the protein or carbohydrate content in the diet. In each of the 2 patients with the disease, a low-calorie, low-carbohydrate diet resulted in a marked, abrupt increase in urine pyrrole excretion. In each case, when total caloric intake, chiefly carbohydrate, was increased, there was an abrupt decrease in pyrrole excretion. When a very high-calorie, high-carbohydrate diet was given, the urine pyrrole excretion was further reduced to levels somewhat lower than those seen during a previous medium-calorie diet period. When griseofulvin was given in addition to a high-calorie, high-carbohydrate diet, there were moderate increases in urinary uroporphyrin excretion. No acute intermittent porphyria symptoms were observed, and the max. levels of uroporphyrin obtained were only 20-30% of those observed in a previous study. In 1 patient, urine porphyrin excretion was no less when griseofulvin was given during a high-calorie diet period than during a medium-calorie diet period; however, when the latter was changed to a high-calorie diet while continuing griseofulvin, a marked reduction in porphyrin excretion occurred. It is suggested that the effect of griseofulvin on prophyrin precursor synthesis is not totally abolished by a high-carbohydrate intake, but is distinctly blunted. In the obese, nonporphyric patient during a 50-day period on a 30-calorie diet, there was no increase in urinary porphobilinogen excretion, even when griseofulvin was concomitantly admin. In the female patient with possible latent porphyria, the admin. of griseofulvin with an unrestricted diet did not increase the porphobilinogen excretion. A small increase, of doubtful significance, in porphobilinogen excretion occurred after 4 days of a 400-calorie diet, but a distinct increase in urine porphobilinogen excretion to 8.7 mg/liter occurred when griseofulvin was given along with a 400-calorie diet; this was also of doubtful significance, although it is presumptive evidence of latent acute intermittent porphyria.

6343 SPLENIC PULP PRESSURE: THE EFFECT OF INJECTION OF CONTRAST MATERIAL DURIN SPLENOPORTOGRAPHY. (E.) Bjorn-Hansen, R. (U. Virginia Sch. Med., Charlottesville) and C. D. Teates. Amer. J. Roentgen. 99(3):612-61 1967.

Splenic pulp pressure was determined in 6 patients (3 with Laennec's cirrhosis with varices, and 1 each with portal vein thrombosis mild cirrhosis with a normal splenoportogram ar esophageal carcinoma with a normal splenoportogram) before and after inj. of 40 ml of 6 methylglucamine diatrizoate (renografin). In all measurements, the zero pressure level was cm H_2O. Pressure before inj. ranged from 130-590 mm H_2O, and after inj. from 270 to mor than 650 mm H_2O. Pressure 10 min. after inj., determined in 4, ranged from 250-650 mm H_2O. Elevation of splenic pulp pressure may be sufficient to cause an erroneous diagnosis of portal hypertension if pressure is not measure before inj.; it is therefore suggested that pressure should always be measured before inj. of contrast material.

6344 PLEA FOR EXACT HEPATIC SEGMENTATION AND ANATOMICAL PRECISION IN LIVER RESECTION. PARTIAL CLAMPING OF THE HEPATIC PEDICLE. (Fr.) Couinaud, C. (Saint Antoine Hosp., Paris, France). Presse Med. 75(55): 2849-2852, 1966.

A critical survey of recent studies on liver resection revealed an anatomical error, the description of the left lobe as a portal entit with 2 segments separated by a sagittal scissu The left lobe is, in fact, a suprahepatic entity (the region of the left suprahepatic vein), separated from the remainder of the liv by the "umbilical" (left suprahepatic) scissur The left liver is divided into 2 sectors from the point of view of the portal circulation. Clamping the hepatic pedicle for not more than 10-15 min. (shorter in the presence of parench failure) will permit a bloodless operative field, but differential clamping of 1 or sever sectorial pedicles is tolerated much longer. In a man with cholangioma of Segments V and VI clamping of the right hepatic pedicle only for a total ischemic period of 6 min. permitted bloodless removal of the involved segments. Partial clamping of this type is recommended t reduce the mortality rate among patients undergoing partial hepatectomy.

6345 PROLONGED SURVIVALS AFTER PARTIAL HEPATECTOMIES AND SECOND-LOOK PROCEDURES FOR PRIMARY AND SECONDARY CARCINOMA OF THE LIVER. (E.) Friesen, S. R. (U. Kansas Sch. Med., Kansas City), C. A. Hardin and C. F Kittle. Surgery 61(2):203-209, 1967.

Several factors which favor successful partial hepatic resection are discussed; these include r methods of diagnosis (including alkaline sphatase determinations, protein electrophoresis new radiologic technics), refinements of rative technic and greater understanding of regenerative power of the liver. Cases are ulated to illustrate long-term survivors of ial hepatic resection of primary and ndary tumors of the liver. Surgical sions, made safer by anatomic studies and by iologic support of the liver, are apparently thwhile for those patients with primary or ndary liver carcinomas. The most promising ture of management, leading to greater success more long-term survivors, is a second-look gram for the detection of lesions, while they small and localized, in asymptomatic patients.

5 CYTOLOGIC DIAGNOSIS OF CANCER FROM ASPIRATED MATERIAL OBTAINED AT LIVER

PSY. (E.) Sherlock, P. (Cornell U. Med. ., New York City), Y. S. Kim and L. G. Koss. . *J*. *Dig*. *Dis*. 12(4):396-402, 1967.

rocedure is described whereby a single liver cture provides material for both cytologic histologic preparations. A total of 62 ients with various diseases of the liver uiring diagnostic liver biopsy were studied. of 13 patients with metastatic carcinoma in liver diagnosed histologically had malignant ls in the cytologic preparation. An itional 2 patients with histologically normal er biopsy specimens had malignant cells on ologic preparation. In addition to diagnosis liver neoplasia, such other diseases as osiderosis, inflammatory processes and fatty iltration were demonstrated by examination of cytologic preparation. A greater sampling the liver is accomplished by microscopically mining material which is normally discarded. results of this investigation demonstrate value of the cytologic examination of irated material and touch preparations from er biopsy specimens in the diagnosis of ors and other diseases of the liver.

7 HISTAMINE FORMATION IN RATS BEARING THE WALKER MAMMARY CARCINOSARCOMA.

) Johnston, M. (U. Lund, Sweden). *erientia* 23(2):152-154, 1967.

lt female rats, Sprague-Dawley and Institute-d, were implanted with Walker mammary cinosarcoma, and the rate of histamine forma-n *in vitro* by the tumor and by the liver was sured for control and tumor-bearing animals. addition, the effect of the enzyme inhibitors ethylhistidine and α-methyldihydroxyphenyl-nine on tumor and liver tissue was investi-ed *in vitro*. Urinary free histamine excretion reased with tumor growth. The rate of tamine formation *in vitro* in liver tissue of or-bearing rats was very much higher than in -tumor bearing controls. The effects of the pounds α-methyl histidine and α-methyldihydroxyphenylalanine on the rate of histamine formation in tumor tissue and liver of the tumor-bearing host were different; in both liver and tumor, the former compound produced 70-90% inhibition of enzyme (histidine decarboxylase) activity, while the latter had almost no inhibitory effect. In an experiment on parabiotic rats (female littermates, 1 of which was tumor-bearing), there was a general elevation of the histamine-forming capacity in many tissues, including the liver. The unusually high excretion of histamine in urine of female rats with Walker mammary carcinosarcoma can be explained by the ability of the tumor itself to form histamine, and also by the increased capacity of the liver in this respect. From the parabiotic rat experiments, it appears that the histamine-forming capacity of several tissues, including the liver, may become elevated and that a blood-borne factor is involved. Observations of high histamine-forming capacity in tumor and enlarged liver tissue support the concept that there is a relationship between high rates of histamine formation and certain types of rapid tissue growth.

6348 EXPERIMENTAL STUDIES OF FACTORS INFLUENCING HEPATIC METASTASES.

XVIII. SIGNIFICANCE OF TRAPPED TUMOR CELLS. (E.) Fisher, B. (U. Pittsburgh Sch. Med., Pa.) and E. R. Fisher. *Proc*. *Soc*. *Exp*. *Biol*. *Med*. 124(3):881-883, 1967.

There was no increase in numbers of intraportally inj. ^{51}Cr-labeled Walker tumor cells in the livers of rats that were subjected to partial hepatectomy, inj. of dextran, hepatic manipulation, reticuloendothelial blockade, high (30%) fat, choline-free diet or caval constriction. These findings indicate that augmentation of hepatic metastases produced by these modalities in this model system is related to their metabolic or biologic ("soil") rather than mechanical influences on hepatic-tumor cell relationships.

6349 PRIMARY HEPATIC STEATOSIS AS A METABOLIC CHANGE IN EARLY DIABETES.

(E. & It.) Knick, B. (U. Clin., Mainz, Germany). *Acta* *Diabet*. *Latin*. 3(2):224-234, 1966.

Diabetes detection tests were conducted in 104 patients (all over 40 yr. of age) with first stage fatty liver of a non-alcoholic etiology and results were compared with healthy subjects and other groups suspected of diabetes. Employing the tolbutamide test, pathological findings were obtained in the fatty liver patient group as well as in the control group of healthy subjects. Primary hepatic steatosis of early diabetes was related 65-70% of the time to excessive body wt. Abnormal results were observed also in the groups of mothers with large babies (birth wt. over 4500 g) and close relatives of diabetic patients. These results suggest that such abnormal results indicate the presence of latent or asymptomatic diabetes mellitus. Fasting values were higher in the fatty liver patient group than in metabolically normal subjects when serum insulin-like activity was assessed. Following tolbutamide or glucose stimulation, insulin reserve analysis showed delayed insulin secretion with high fasting values (a high serum insulin-like activity) in the fatty liver patient group. It is concluded that hepatic steatosis is an abnormal manifestation of an underlying lipogenic insulin effect on the liver and may well represent a metabolic change preceding asymptomatic diabetes.

6350 STEATONECROSIS--MALLORY BODY TYPE. (E.) Harinasuta, U. (VA Hosp., Washington, D. C.), B. Chomet, K. Ishak and H. J. Zimmerman. Medicine (Balt.) 46(2):141-162, 1967.

A study of the clinical, biochemical and histologic features of steatonecrosis (Mallory body type) is presented, based upon clinical records and liver sections of 175 patients whose livers showed Mallory bodies. Characteristic histologic findings of necrosis, fatty metamorphosis and Mallory bodies may occur with or without cirrhosis. This syndrome apparently represents a form of acute metabolic failure of the liver resulting from severe, prolonged alcoholism and malnutrition. It is a complication of fatty metamorphosis or of developing cirrhosis, which most frequently affects relatively young or middle-aged patients, and is usually characterized by jaundice and fever, with or without coma, gastrointestinal hemorrhage or ascites. Portal hypertension, spider nevi, coagulation defects and testicular atrophy occur frequently. Impaired BSP excretion, elevated alkaline phosphatase levels, hyperbilirubinemia and increased values of SGOT occur in most patients. Values for SGOT exceed those of SGPT. Hypoalbuminemia and hyperglobulinemia frequently occur. The prognosis is grave in the deeply jaundiced, azotemic, hypothrombinemic patient with steatonecrosis. Death is usually due to hepatic coma, gastrointestinal hemorrhage or intercurrent infection; sudden death, of unknown specific cause, has an appreciable incidence. In the moderately jaundiced patient, whose blood urea nitrogen level is not elevated and whose prothrombin time is only slightly prolonged, prognosis is usually good. Typical histologic abnormalities may occur in patients who are anicteric and whose bilirubin levels are only slightly elevated. Conversion of mild to severe steatonecrosis possibly may be induced by associated pancreatitis and other organic sequelae of alcoholism, infection, accidents of cirrhosis (such as gastrointestinal hemorrhage), or other intercurrent circumstances.

6351 CLINICAL IMPLICATIONS OF FATTY LIVER. (E.) Palmer, E. D. (VA Hosp., E. Orange, N. J.). GP 35(4):125-131, 1967.

Simple nutritional fatty liver was diagnosed biopsy in 131 patients (119 male and 12 femal who were subsequently treated as outpatients up to 7 yr. (approx. 25% for over 4 yr.). Heavy alcohol ingestion over long periods was related by 98 patients. Diagnostic procedure included single or multiple needle biopsy of liver, upper gastrointestinal studies and sir or multiple esophagoscopy. Only 11 patients sought medical assistance for conditions rela to liver disease, including variceal bleeding resulting in hematemesis (5), jaundice (3), simple recurrent dyspepsia (2) and chronic ri upper quadrant pain (1). The remaining 120 patients were discovered to have hepatomegaly either during hospitalization for other complaints (77) or routine physical examinati (43). Of the 131 patients, 122 presented hepatomegaly. Other gastrointestinal conditi included duodenal ulcer (24), hiatus hernia subacute esophagitis (15), gallstones (7), ga tric ulcer (4), diverticulosis (3), post-gastrectomy state (3) and chronic relapsing pancreatitis (9). Esophageal varices were found in 54 patients (11 showed hemorrhage). Therapy consisted of abstinence of alcohol, reduction in obese patients, appropriate diet regimen and control of diabetes. Most improv ment was subjective in character with no pat showing liver fat clearance. No patient died during observations or progressed to cirrhos Varices appeared unchanged in 8 patients whe observed by successive esophagoscopy (up to yr.) while the condition worsened in 5 patie

6352 FATTY LIVER IN THE RAT AFTER PROLO INTAKE OF ETHANOL WITH A NUTRITION ADEQUATE NEW LIQUID DIET. (E.) DeCarli, L. (Bellevue Hosp., New York City) and C. S. Li J. Nutr. 91(3)(Pt. 1):331-336, 1967.

Male Sprague-Dawley rats were fed liquid die containing 18% of calories as casein, supplemented with methionine (0.3 mg/kcalorie) and cystine (0.5 mg/kcalorie), choline (0.25 mg/kcalorie), fat (35% of total calories), adeq minerals and vitamins and, in the control di 47% of the calories as carbohydrate. A litt mate of each control rat was pair-fed with t same diet in which carbohydrate had been isocalorically replaced with alcohol to the extent of 36% of the total calories. This dietary regimen assured continued growth in animals and normal liver in the controls, wh in the rats fed with alcohol, fatty liver developed, which was evident both morphologi and on chemical analysis; after 24 days of alcohol, hepatic triglycerides had increased the av. 6-fold and cholesterol esters 5-fold compared with those of the controls. These results show that prolonged alcohol intake c produce a fatty liver even when admin. with diet with nutritionally adequate content of tein, vitamins and minerals, and an amount o fat less than that of the av. American diet.

AUXILIARY LIVER TRANSPLANTATION IN DOGS WITH ARTERIALIZATION OF THE POR- EIN. PRELIMINARY COMMUNICATION. (E.) s, G. L. (Yale U., New Haven, Conn.), D. eeckeren and I. Matano. Int. Surg. 47(3): 23, 1967.

dogs in which auxiliary liver homografts performed and the portal vein was perfused mixed arterial and venous blood, 3 dogs ved more than 7 days while 4 dogs survived ays and 7 dogs succumbed during or iately after transplantation. Interruption e host's portal circulation was precluded is simplified method by inserting the homo- into the systemic circulation (an arterio- s fistula between the right femoral vessels erformed 4-5 days previously). Dogs ving less than 1 day died from hepatic rhage or portal vein hypertension. In dogs ving over 7 days, histologic examination at s showed focal fibrosis without cirrhosis ith minimal necrosis. In addition, prominent lar proliferation, canalicular cholestasis, al round cell infiltration and no evidence jection were observed in this same group. f auxiliary livers were 30-85 g greater than of the host liver in 4 dogs and 20 g less dog in the max. survivor group.

HOMOTRANSPLANTATION OF THE CANINE LIVER AFTER HYPOTHERMIC PERFUSION OF DURATION. (E.) Kestens, P. J. (U. Louvain, um), P. Mikaeloff, J. J. Haxhe, G. Dureau, exandre, J. P. Rassat, J. Cuilleret, A. un, M. Dubernard, J. Descotes and J. Morelle. Soc. Int. Chir. 25(6):647-659, 1966.

topic homotransplantation (12) in the dog ccomplished following hypothermic perfusion ng between 90 and 325 min. (12-18°C chymal temperature, with 10°C being main- d during the last 10 min. of perfusion). g perfusion, blood flow as well as portal rterial pressures were normal as also was pH. SGOT and SGPT levels increased some- whereas LDH was constant and normal during sion. A slight reduction in plasma K s was observed. Gross appearance of the during perfusion was normal in all except es. Av. duration of venous bypass was 20 with the mean period of hepatic anoxia being n. After anastomoses most dogs were in health with elevated blood ammonia levels sed after transplantation. Transaminase DH values were slightly increased before plantation, but stabilized after 1 hr. wing grafting. BSP retention ranged from % in 3 dogs after grafting (irreversible nolysis in 1 dog resulting in fatal rhage). During early postoperative period, ased transaminase levels (a mean SGOT and value of 102 and 165, resp., after 4 days) noted along with normal bilirubin and LDH s. Survival times included periods ding 5 days (9 dogs), exceeding 10 days (7 dogs) and 4 dogs alive after 50, 17, 14 and 12 days, resp. The success of this study probably indicates that maintenance of viability of a cadaver liver during preparation of recipient patient can be achieved.

6355 HEPATIC HETEROTRANSPLANTATION. (E.) Arena, A. J. (Albany Med. Coll., N. Y.), J. H. Carter, J. R. Cooper, J. Margulies and C. S. Welch. Bull. Soc. Int. Chir. 25(6): 660-670, 1966.

Hepatic transplants of cat livers to dogs were divided into 4 experimental categories, including 26 heterotopic transplants with autologous hepatectomy (Group 1); 2 orthotopic transplants (Group 2); 7 heterotopic transplants without autologous hepatectomy (Group 3) and 3 heterotopic transplants with delayed re-exploration (Group 4). After completion of transplantation, a dextrose soln. was continuously given until death ensued. Postoperatively, prolonged clotting times with unmanageable rapid lysis were frequently observed in the 15 survivors from Group 1 as well as elevated blood ammonia and transaminase levels. Nine dogs showed a hemorrhagic diathesis at autopsy, while the cause of death was not apparent in the remaining 6 dogs. Most transplanted livers were dark in color and congested, with all anastomoses being patent. In Group 2 dogs, 1 died during surgery from portal bed block, while the second dog, which died 3 hr. postoperatively, manifested a hemorrhagic diathesis at autopsy. The 4 dogs from Group 3 who survived for more than 24 hr. (36 hr., 9 days, 12 days and 14 days) finally succumbed with the latter 3 maintaining good activity until 1-2 days prior to death. Daily biliary drainage (initially hemorrhagic) ranged from 5-20 ml over the 5-6 day period. Normal clotting times as well as serum bilirubin and blood ammonia were not abnormal. Only 1 dog from Group 4 was subjected to later hepatectomy (on fourth post-transplant day) and died 10 hr. later following a course characterized by loss of eye and swallowing reflexes, coma, and jerking movements of the extremities. No prolongation of clotting time or hemorrhage was observed in this group.

6356 ACTIVE SENSITIZATION FROM HETEROLOGOUS LIVER PERFUSION. (E.) Bibler, D. D., Jr. (U. Washington Sch. Med., Seattle), R. E. Condon and L. M. Nyhus. Bull. Soc. Int. Chir. 25(6):671-679, 1966.

Bovine and porcine livers were perfused with human blood obtained from open heart procedures for 5.5 hr. Blood pressure during perfusion was maintained at normal levels by varying the flow rate, and plasma samples which were obtained both before and after perfusion were evaluated by immunoelectrophoresis. All perfusions demonstrated the existence of heterologous proteins. Following recovery from hepatic insufficiency (one-stage Eck fistulae) and 70% hepatectomy, the blood from these 4 dogs and 2 normal control dogs was perfused through a bovine liver for 2 hr. Bovine protein was demonstrated in every sample of blood after perfusion. Bovine plasma (with protein) was inj. i.v. 11-35 days after perfusion. Two dogs in hepatic insufficiency showed anaphylactic reactions within 5-7 min. after inj. with one succumbing 12 hr. later and the other recovering fully in 1 hr. In the former dog, moderate congestion of the liver and lungs was shown at autopsy. No reaction was observed in the other 2 dogs (1 control, and 1 with hepatic insufficiency). A second perfusion, 28 days after the first, in a control resulted in death in 18 hr. with no apparent anaphylaxis. At autopsy, focal hemorrhage of the liver in this control was observed along with moderate central and portal vein necrosis, with slight cellular necrosis noted at light microscopy. Areas of atelectasis were also observed. Marked fatty infiltration was seen in the livers of dogs with hepatic insufficiency. Employment of heterologous liver perfusion in patients can result in sensitization, with the possibility of anaphylaxis following a second perfusion after a period of latency.

6357 ORTHOTOPIC AUTOTRANSPLANTATION AND ALLOTRANSPLANTATION OF THE LIVER: FUNCTIONAL AND STRUCTURAL PATTERNS IN THE DOG. (E.) Stuart, F. P. (Harvard Med. Sch., Boston, Mass.), E. Torres, W. J. Hester, G. J. Dammin and F. D. Moore. Ann. Surg. 165(3):325-340, 1967.

A technic of orthotopic hepatic allotransplantation in dogs is described in detail; principal features of this method are a temporary "Y" shunt for hepatic venous bypass and anastomosis of the recipient renal artery to the donor celiac artery. Hepatic autotransplantation, using a modification of the allotransplantation procedure, was done on 4 dogs; only minor functional and structural changes were noted in the autotransplanted livers. Azathioprine, given to 6 normal dogs, caused only minor adverse effects on the liver. Orthotopic allotransplantation of the liver was performed on 52 dogs. Four immunosuppressive protocols were tested; the first, actinomycin-C alone, did not prolong survival of the graft. Three protocols using various combinations of azathioprine, actinomycin C and local X-irradiation of the liver, were equally effective in their modest ability to prolong graft survival. Six dogs survived more than 50 days; the longest survivor lived 88 days. All 6 dogs were undergoing slow hepatic rejection and had upper gastrointestinal ulceration at the time of death; massive hemorrhage from upper gastrointestinal ulcers was the immediate cause of death in 5 of the six dogs. Ulceration was prevented by subtotal gastric resection, but not by vagotomy and pyloroplasty. It is suggested that the ulceration was acid-peptic in nature and may have been due to an humoral mechanism associated with hepatic rejection.

6358 ASANGUINOUS HYPOTHERMIC LIVER PERFUSION IN DOGS. (E.) Ono, H. (U. California Sch. Med., Los Angeles), G. D. Buckberg and W. P. Longmire, Jr. J. Surg. Res. 7(4):152-159, 1967.

An original, consistently reproducible and simplified technic for the isolation and perfusion of the canine liver in vivo was developed after experimentation on more than 60 dogs. By means of an abdominal approach, hepatic outflow was isolated by use of an intracaval shunt and creation of a chamber containing pure hepatic effluent surrounding the shunt. The necessity of extracorporeal circulation and heparinization was eliminated. This procedure is free from systemic admixture, as shown by BSP determination. Regional hepatic hypothermia is maintained at 14-16°C without systemic hypothermia. Contamination with blood is reduced to less than 1 ml/min. (the effluent hematocrit is consistently less than 1%) after the washout. Hepatic outflow block was not seen either during or after perfusion. Hypotension did not follow revascularization in perfusion lasting up to 90 min. Mild hypotension occurred after perfusions of up to 180 min., but it was spontaneously reversed without the need for vasopressors. Altogether, 11 of 15 dogs survived after being perfused between 60 and 90 min.; 3 of 6 dogs survived after being perfused 120 min. Death could not be attributed to hepatic failure in dogs perfused for longer periods of time.

6359 OBSERVATIONS ON THE EFFECTS OF GLYCEROL IN THE COLD STORAGE OF THE CANINE LIVER. (E.) Moss, G. S. (U. Manchester England), P. C. Reed and A. G. Riddell. J. Surg. Res. 6(4):147-151, 1966.

The protective role of glycerol in the whole-organ cold storage of the canine liver is reported. Following liver removal, the organ was infused with increasing conc. of glycerol at 5°C in 3 stages (500 ml of 10%, 20% and 33% glycerol soln.) and sealed in a plastic bag containing 33% glycerol and then stored at -20°C for 24 hr.-2 wk. Final thawing involved placement in a domestic regrigerator until -13°C was attained which was then followed by temperature infusion and gradual 'deglycerolization' using decreasing conc. of glycerol. These specimens were divided into 2 groups; 1) placement in an isolated pump oxygenator circuit and perfused, or 2) transplantation into the right paracolic gutter of healthy dogs (9 transplants). A control series of 4 livers was established for comparative purposes. In the isolated perfusion series, significant O_2 uptake (less than controls) was

erved; impaired BSP clearance and unsatis-
:tory flow rates however for less than 1 hr.
3 specimens. In 3 livers of the transplant
ries, BSP uptake measured after 1 hr. of cross-
rculation (portal vein-to-portal vein
astomoses performed) were poor, but signifi-
nt, in 2 dogs and absent in the other 1. None
the 6 dogs with end-to-side anastomosis
rvived. Other post-transplant phenomena
cluded a deep-red coloration and oozing from
ver surface, clotting disturbance, leakage
om suture lines, gross hemolysis, metabolic
idosis and reduction in fibrinogen levels.
stologically the most important change due to
ycerolization was widening of the sinusoids,
pecially after, complete freezing, which was
solved after thawing and 'deglycerolization'
less irretrievable damage had occurred.
cuolization of the cytoplasm increased with
oling and decreased again on warming. Many
clei became pyknotic after freezing. The
caffold' pattern of the cell reticulum was
eatly damaged in a few cases. During periods
cold storage, a gradual decrease in glycogen
ntent was indicated by serial section studies.

60 A METHOD FOR COLD PRESERVATION OF LIVER. (E.) Brown, H. (Harvard Med.
h., Boston, Mass.), J. Patel, D. W. Blair,
M. Barsamian and W. V. McDermott, Jr. J.
rg. Res. 7(2):71-77, 1967.

nine liver dehydrated 5%-36% was stored for as
ng as 45 days at -6°C immersed in either 2 M
ycerol or 2 M dimethylsulfoxide soln., without
eezing, by a method termed "supercooling".
e activity of 4 urea cycle enzymes studied
rginase, carbamyl phosphate synthetase,
rnithine transcarbamylase, argininosuccinase)
emained normal during this period. In 7
periments, livers preserved as long as 5 days
ere heterotopically transplanted and survived
-6 additional days, as judged by survival of
e recipient, patency of blood vessels and
ross appearance. Technical difficulties and
roblems with early transplant rejection were
ncountered; nevertheless, it is concluded that
is method (or some refinement of it) will
ventually offer an experimental means for pro-
onged liver preservation.

361 THE FUNCTIONAL CAPACITY OF PIG LIVER PERFUSED WITH HUMAN BLOOD. (Ger.)
oeckl, O. (Salzburg Hosp., Austria), E. Hell,
. Zimmermann and H. Schroll. Wien. Klin. Wschr.
9(1):17-19, 1967.

ivers of Minnesota dwarf pigs (17-45 kg) were
xcised, the cystic duct ligated, the bile duct,
he inferior vena cava, and the hepatic artery
r the portal vein catheterized, after inj. of
0,000 U of heparin. The livers weighed
30-1040 g. The vascular system was washed out
ith saline at 4°C containing 2500 U heparin/
00 ml for 10-20 min. until the liver was cooled and completely freed of blood. Placed in a heart-lung apparatus with regulated temperature, the liver was perfused with heparinized human blood (supplied via the portal vein or hepatic artery and drained through the inferior vena cava). During the entire perfusion continuing blood gas analyses, pH and pressure measurements were made; adjustments kept these parameters within normal range. The usual duration of perfusion was 3 hr. BSP test, blood picture, hematocrit, electrolyte determination, SGPT and LDH measurements were made; the vol. of bile was measured. Also measured was the clearance of 131I-Bengalrose. In the case of 1 animal a SBP test was made prior to liver excision, after excision during perfusion with autologous blood and then with heterologous blood. The vol. of bile was measured for 3 hr. during autologous and heterologous perfusion. The BSP test showed dye retention of 4.8% after 60 min. in vivo, 43% in autologous, and 63% in heterologous perfusion. Bile production was less than half during heterologous as compared to autologous perfusion. RBC count, hemoglobin conc., and hematocrit sharply decreased, whereas serum enzymes and hemolysis increased during perfusion with human blood. The liver excretion of 131I-rose bengal showed marked impairment after the first hr. of perfusion. Pig liver, perfused with human blood under controlled normal conditions, retains its functional capacity for 3 hr. at most. In principle it is possible to use the pig liver for the removal of impurities from human blood after clarification of technical and clinical details.

6362 CONTINUOUS MONITORING OF TRANSHEPATIC VASCULAR RESISTANCE IN THE ISOLATED PERFUSED EX-VIVO PORCINE LIVER: EXPERIMENTAL AND CLINICAL METHODS. (E.) Norman, J. C. (Harvard Med. Sch., Boston, Mass.), W. J. Robinson, E. J. McDonald and W. V. McDermott, Jr. Med. Res. Engineer. 6(1):17-19, 1967.

Technics of continuous visual monitoring of relative transhepatic resistance in isolated perfused ex-vivo porcine liver preparations are described. In experimental systems, oxygenated blood is achieved by recirculating blood from the outflow channel through a column bubble oxygenator, whereas, in clinical setups, arterial blood from the patient is gravity-fed to the liver specimen and then pumped through an extracorporeal filter back to the patient. Effective transhepatic vascular resistance is represented by a running quotient which issues from a computer which has accepted an amplified transhepatic pressure gradient (delta P). This gradient results from continuous subtracting of outflow from inflow pressure in mm Hg by a single differential pressure transducer. Connected with the computer is a flowmeter which in turn is connected in series with either the inflow line from the disposable oxygenator or with the patient's brachial artery. In clinical trials, during acute hepatic failure, artificially induced increases and decreases in resistance resulted in corresponding alternate increases and decreases in flow and small alternate increases and decreases in transhepatic pressure gradient. Residual hypothermia (porcine liver was subjected to hypothermia to preserve viability during periods of total ischemia) was indicated by a monitored increase in resistance. Increased resistance and decreased gravity flow rates were observed in both experimental and clinical acidosis of perfusates (reversed by pH maintenance between 7.35 and 7.4). Gradual increase in resistance resulted from both experimental and clinical increase in length of perfusion time. However, no significant increases were noted after 9 hr. of clinical perfusion in which rates exceeding 1,200 ml/min. were accepted by the porcine liver.

6363 OBSERVATIONS AND MANAGEMENT AFTER HEPATIC ARTERY LIGATION. (E.) Mays, E. T. (U. Louisville Sch. Med., Ky.). Surg. Gynec. Obstet. 124(4):801-807, 1967.

A 53-yr.-old Caucasian male presented with multiple (15-20) self-inflicted abdominal stab wounds (most of which were superficial). At laparotomy, a clean sharp through-and-through stab wound of the left lobe of the liver was noted just a few cm to the left of the falciform ligament, on the inferior border; the wound of exit was in the region where the left hepatic artery entered the hilum of the liver. The latter artery was dissected free and ligated close to its entrance into the liver. Except for a brief bout of delirium tremens, the postoperative recovery of this patient was uneventful. This patient was unique from 3 standpoints: 1) the hepatic artery was intentionally ligated and liver function was normal; 2) there was an absence of a state of shock; and 3) there was a lack of damage to liver cells or previous hepatic dysfunction. Blood chemical studies showed a mild and temporary depression of the ability of the liver cells to synthesize protein. SGOT decreased from 60 U/ml at 5 days after operation to 19 U/ml at 43 days; SGPT decreased from 36 U/ml to 20 U/ml. Cephalin flocculation was 2+ at day 5, 0 at day 12 and a trace at day 25. Total protein increased from 5.9 g% at day 5 to 7.3 g% at day 43. Bilirubin decreased from 1.4 mg% at day 5 to 0.65 mg% at day 43. Detoxification, excretory function and carbohydrate metabolism appeared unchanged. Liver scintiscans revealed a persistent decrease in radioactive Au uptake in the left lobe; since the same decrease in uptake was observed at 6 wk. after ligation and during this time liver function studies had greatly improved, it probably represented a permanent decrease in the amount of arterial blood flow to this lobe rather than cellular dysfunction. In this patient, survival and hepatocellular viability was more dependent upon portal venous flow than on collateral arterial flow. This and other studies signify that the concept of interrupting arterial flow in man is undergoing a gradual change.

6364 THE EFFECT OF INTRAHEPATIC BILE STASIS, CATECHOLAMINES AND HYPERTENSION ON THE HEPATIC ARTERY BLOOD FLOW. (E.) Kubiak, J. (Med. Acad., Warsaw), J. Litwin, H. Rykowski, L. Bielecki and M. Simoni. Bull. P Med. Sci. Hist. 10(1):28-32, 1967.

The effect of acute bile stasis and admin. of catecholamines and hypertensin on hepatic arterial blood flow was studied in 12 anesthet dogs; systemic arterial blood pressure, centra venous blood pressure and hepatic arterial bl flow were registered. Peripheral resistance obtained from the quotient of the mean arteri systemic blood pressure and blood flow in the hepatic artery. In controls, blood flow was 44.1 ml/min. and peripheral vascular resistan was 2.05 peripheral resistance U. Following ligation of the common bile duct, these parameters were determined after 1, 2, 3, 4 and 9 days. Blood flow in the hepatic artery decreased to 15.1 ml/min.; vascular resistance the hepatic artery increased to 10.9 periphera resistance U. Decrease in blood flow in the hepatic artery during acute bile stasis was caused by 2 factors: 1) mechanical pressure exerted on the arteries by the dilated bile ducts, and 2) the effect of some vasoconstrictive substances (such as dehydrocholic acid) absorbed from the bile. Histological study of liver sections revealed that complete ligatio of the common bile duct produced a temporary hyperemia, a stasis of the bile and then a proliferation of connective tissue in the live parenchyma. Catecholamines and hypertensin (b increasing systemic arterial blood pressure) increased flow in the hepatic artery and at th same time decreased the hepatic blood flow (by their direct vasoconstrictive effect) in controls and in experimental dogs with bile stasi Under these conditions, hypertensin elevated the systemic arterial pressure, but this was followed by a decrease in the hepatic arterial blood flow. This fact should be considered before use of hypertensin in cases of frank liver pathology.

6365 TRANSUMBILICAL PORTAL HEPATOGRAPHY, SIGNIFICANT ADJUNCT IN THE INVESTIGATION OF LIVER DISEASE. (E.) Piccone, V. A. (VA Hosp., Brooklyn, N. Y.), H. H. LeVeen, J. White, G. B. Skinner and L. D. MacLean. Surge 61(3):333-346, 1967.

Portal hepatography, with an indwelling catheter placed directly in the portal vein by way of the umbilical vein, was performed on 60 patients. A consistently high-quality contras visualization of the portal vasculature was provided. Selective lobar angiography, 2-plan visualization and serial films provided significant, precise information about the

tion and size of space-occupying lesions
the dynamics of portal and collateral
ulation. Lesions as small as 1.0 cm in
eter were readily located; the collateral
ulation in portal hypertension was vividly
mented. Transumbilical portal hepatography
valuable in the recognition of intrahepatic
ons, in the differentiation of extrahepatic
ons contiguous to the liver, in the
nstration of vascular anomalies and in
rate placement of the needle for liver
sy. There was little morbidity and no deaths.
opportunity for concomitant liver biopsy
serial portal manometry, together with the
tanding radiologic clarity itself, demon-
te that this procedure is a significantly
rior method in the investigation of liver
ase.

COMPLIANCE OF THE LIVER. (E.) Wood,
W. (U. Kentucky Med. Sch., Lexington),
ait and B. Eiseman. Surgery 61(3):407-416,
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effect of altering both perfusion pressure
hepatic venous (outflow) pressure was
uated as they affect flow and the wt. of the
ivo pig liver. Critical closing pressure of
liver under these perfusion conditions was
cm H_2O. The anticipated sigmoid
tionship between perfusion pressure and flow,
h has a plateau at approx. 200 cm H_2O
usion pressure, was observed. The pig
r will hold more than twice (209%) its
y wt. of blood when fully engorged. In-
se of the hepatic venous pressure caused
ention of the liver in proportion to the
low pressure within physiologic perfusion
sures. Compliance was expressed numerically
he increase in liver vol./10 mm Hg increase
epatic venous pressure. Normal pig liver
ed max. compliance with resistance incre-
s at low hepatic venous pressures.
liance progressively decreased as the liver
me max. engorged at 30 mm Hg hepatic venous
sure. Analogous to the pressure-vol.
tionships of the lung, hysteresis loops have
described for the normal liver. The
ications of hepatic compliance as it may
r function in the cirrhotic liver are
ussed.

7 HEPATIC PORTOGRAPHY BY DIRECT
CATHETERIZATION OF THE PORTAL VEIN
OUGH THE ROUND LIGAMENT OF THE LIVER
GAMENTUM TERES). (E.) Chiandussi, L. (U.
in, Italy), G. Juliani, F. Greco, D. Cravero,
Sardi and G. Toscano. Amer. J. Roentgen.
3):625-628, 1967.

atic portography by direct catheterization of
portal vein through the round ligament of
liver (ligamentum teres) was successfully
formed in 2 of 3 subjects with a normal liver
in 7 of 8 patients with well-compensated liver cirrhosis (in 1 of 8, cirrhosis was associated with a primary tumor of the left lobe of the liver), with no complications being noted. The whole procedure lasted 20-30 min., unless various portal vein parameters were determined. Direct catheterization of the portal vein allows direct measurement of the portal pressure, determination of portal vein blood flow separately from flow of the hepatic artery, direct portography and biochemical assay of portal blood. This procedure appears to be safer than splenoportography and is the technic of choice in patients with suspected portal hypertension and splenectomy, with thrombosis of the splenic vein and with incomplete visualization of the portal intrahepatic vascular tree of the left lobe. It is helpful in interpreting false images of portal vein thrombosis in patients with portal hypertension and large gastro-esophageal collateral circulation. Extremely clear visualization of the networks of the smallest intrahepatic branches of the portal vein and an excellent late hepatographic effect can be obtained by direct portography. This technic is more difficult to perform than other procedures, the splenic vein and the portosystemic collaterals are not demonstrated, and the main portal trunk is only partially visualized. However, in selected cases the advantages of this procedure outweigh its limitations.

6368 CENTRAL SPLENORENAL SHUNT IN THE TREATMENT OF PORTAL HYPERTENSION. (Fr.) Bismuth, H. (Bichat Hosp., Paris), J. Moreaux and J. Hepp. Ann. Chir. 20(25-26): 1441-1445, 1966.

Splenorenal anastomosis was performed in 30 patients with extrahepatic (5) or intrahepatic blockage (25; 22 with cirrhosis). On 5 occasions the procedure was performed for emergency correction of hemorrhage; 2 patients died after 1 or 10 days. In 4 patients with portal thrombosis, there were no postoperative deaths or recurrent hemorrhages; in the other group of 21 patients there was 1 operative death (Gram-negative septicemia) within 1 mo. and 2 patients (both with cirrhosis, ascites and encephalopathy at admission) died 3-4 mo. after surgery. In the surviving patients the follow-up time was too short for adequate evaluation (2-22 mo., av. 1 yr.), but at the time of report none of the patients had developed encephalopathy or recurrent bleeding esophageal varices. Splenorenal shunt is recommended as the elective procedure in cirrhosis if the splenic vein is of sufficiently large diameter.

6269 ^{131}I STUDIES OF THE LIVER AND PORTAL CIRCULATION. (E.) Rozenbilds, J. G. (Roy. Adelaide Hosp., Australia) and R. C. Bennett. Aust. New Zeal. J. Surg. 36(3): 234-237, 1967.

The hepatic uptake of rectally-admin. ^{131}I (20 μC) was studied in 36 subjects. A wide range of normal values was obtained in 20 normal controls; equilibration time (the time taken after inj. for activity to attain a steady level) ranged from 3-38 min., with a mean of 21.6 min. There was a considerable overlap between the range of values obtained in normal subjects and in patients with cirrhosis of the liver and hepatic tumors, but mean values for each group were almost identical; in 10 liver cirrhotics, equilibration time ranged from 4-38 min., with a mean of 20.6 min. In 1 case of portal hypertension studied before and after portacaval anastomosis, equilibration times were 13 and 11 min., resp. In 6 patients with hepatic tumor, equilibration time varied from 12-30 min., with a mean of 21.3 min. These results do not support the findings and conclusions of previous workers that this technic is valuable in the detection of hepatic abnormalities.

6370 EXPERIMENTAL STUDIES OF THE PATHOGENESIS OF SPLENOMEGALY IN THE PORTAL HYPERTENSION SYNDROME. (Fr.) Psomopulos, N. (U. Athens, Greece). J. Chir. (Paris) 93(1): 93-98, 1967.

Obstruction of the splenic vein produced a reduction in the flow of the splenic artery of dogs and an increase in spleen size, but after the obstruction was released the spleen returned to below normal size. In animals with splenic contraction induced by norepinephrine (0.02-0.04 mg/kg), blood circulation from the splenic artery to the splenic vein increased and a marked reduction of the difference between arteriovenous saturation levels was noted. Large arteriovenous anastomoses were seen in corrosion preparations of the spleen after norepinephrine admin.

6371 VASOPRESSOR RESPONSE TO THE INTRASPLENIC INJECTION OF NOREPINEPHRINE IN DOGS WITH AND WITHOUT PORTAL SYSTEMIC VENOUS COMMUNICATIONS. (E.) Aldrete, J. S. (Mayo Clin., Rochester, Minn.), C. Nava, D. C. McIlrath and G. A. Hallenbeck. Surgery 61(3): 461-465, 1967.

The femoral arterial pressor response to intrasplenic and peripheral venous inj. of norepinephrine was determined in normal dogs and in those with 1 of the following procedures: 1) portacaval transposition, 2) portacaval shunt, 3) ligated portal vein, and 4) constricted portal vein. A significant elevation of systemic blood pressure was noted in all dogs with portal collateral communications after the intrasplenic admin. of norepinephrine. Intrafemoral inj. of norepinephrine elevated the arterial pressure in all dogs, except those with portacaval transposition. These findings suggest that the systemic arterial pressor response to intrasplenic inj. of norepinephrine is an accurate method of determining the presence of portal-systemic communications in dogs.

6372 A ONE-STAGE HEPATECTOMY WITH VENA CAVAL HOMOTRANSPLANT. (E.) McBride, C. M. (U. Texas, Houston) and J. E. Healey, Jr. Surgery 61(3):455-460, 1967.

A one-stage hepatectomy, using a caudal vena caval homotransplant to bridge the defect, was performed on 10 adult mongrel dogs. This metho is rapid, requires a minimum of surgical dexterity and is not prone to technical failure The mean period of interruption of the portal and caval return flow was 6.5 min., with a range of 3-11 min. Change in mean blood pressure between the prehepatectomy reading and the 2-hr. posthepatectomy reading was -5 mm Hg, with a range from +10 to -15 mm Hg. Mean survival time was 16 hr.; 1 dog survived for 26 hr. At the end of 26 hr., the caudal vena cava homograft was grossly normal and only an infiltration of polymorphonuclear WBC and loss of muscle nuclei were seen microscopically. Over a 5-hr. follow-up period, the only significant changes detected were a fall in blood sugar (from a prehepatectomy mean of 114 mg% to less than 20 mg%, which required a mean time of 2 hr. after hepatectomy, with a range from 1-3 hr.) and an increase in serum uric acid, from approx. 1 mg/100 ml to approx. 8 mg/100 ml.

6373 CANNULATION OF THE THORACIC DUCT AND UMBILICAL VEIN IN PATIENTS WITH PORTA HYPERTENSION. (E.) Cueto, J. (West Virginia U. Med. Ctr., Morgantown) and R. A. Currie. Ann. Surg. 165(3):408-414, 1967.

The results of combined thoracic duct and umbilical vein cannulation in 5 patients (3 men 2 women; 33-71 yr. old) with portal hypertensio is described. Thoracic duct cannulation in the neck is a method for decompression of the portal venous bed in patients with portal hypertension due to intrahepatic blocks at the sinusoidal or postsinusoidal levels; it is accompanied by a significant decrease in portal venous pressure and can be used to control bleeding from esophageal varices. Preliminary observations indicate that this maneuver is valuable in the management of patients with this complication of portal hypertension. Umbilical vein cannulation also allows direct determination of portal venous pressure and visualization of the intrahepatic portal venous system. A combination of these 2 procedures is recommended in the diagnosis and management of selected patients with portal hypertension.

6374 STEPPED APPROACH TO THE LIVER AND EXTRAHEPATIC BILIARY TRACT. (Rus.) Telkov, N. A. (Semipalatinsk Med. Inst., USSR) Klin. Khir. (Kiev) (3):16-20, 1967.

6375 ACUTE INTERMITTENT PORPHYRIA IN PREGNANCY. (Fr.) Dumont, M.

ic. Med., Lyon, France) and J. L. Cosentino.
ec. Obstet. (Paris) 66(1):75-94, 1967.

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ich, Germany) and G. Strube. Munchen. Med.
hr. 109(5):233-237, 1967.

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ER AND EXPERIMENTAL GOLD THIOGLUCOSE OBESITY.
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COPPER IN NORMAL HUMANS AND IN
SON'S DISEASE. (E.) Neumann, P. Z. (Montreal
ild. Hosp., Quebec, Canada) and M. Silverberg.
ture (London) 213(5078):775-779, 1967.

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COPPER IN PATIENTS AFFECTED WITH
PATOLENTICULAR DEGENERATION AND IN CLINICALLY
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usa, L. (U. Turin, Italy), A. Cravario and A.
ccio. Fegato 12(4):433-454, 1966.

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(Ger.)(Rev.) Froesch, E. R. (U.
rich, Switzerland), A. Bühlmann and P. H.
ssier. Verh. Deutsch. Ges. Inn. Med.
:199-220, 1967.

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LEVELS IN HEPATIC COMA. DIAGNOSIS,
RVEILLANCE AND TREATMENT. (Fr.) Dupuy, R.
eaujon Hosp., Clichy, France) and J. Thiroloix.
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6385 AMINO ACID METABOLISM IN ENCEPHALOPATHY (ESPECIALLY HEPATIC COMA). (Ger.)(Rev.) Knauff, H. G. (U. Marburg, Germany). Verh. Deutsch. Ges. Inn. Med. 72: 165-184, 1967.

6386 CIRCULATION, OXYGEN AND GLUCOSE METABOLISM OF THE BRAIN IN ENCEPHALOPATHY. (Ger.)(Rev.) Gottstein, U. (U. Clin. Kiel, Germany). Verh. Deutsch. Ges. Inn. Med. 72:185-198, 1967.

6387 COMPARATIVE VASOGRAPHIC AND SCINTIGRAPHIC STUDIES OF LIVER TUMORS. (Ger.) Düx, A. (U. Bonn, Germany), C. Winkler, G. Esser and E. Bücheler. Fortschr. Rontgenstr. 106(4):502-524, 1967.

6388 INFUSION CHEMOTHERAPY IN HEPATOMA AND METASTATIC LIVER TUMORS. (E.) Gorgun, B. (West Virginia U. Med. Ctr., Morgantown) and A. L. Watne. Amer. J. Surg. 113(3):363-368, 1967.

6389 HEPATIC GAMMASCANNING AS AN AID IN THE MANAGEMENT OF PATIENTS WITH MALIGNANT LYMPHOMAS. (E.) Molander, D. W. (139 E. 36th St., New York, N. Y.), I. M. Ariel and G. T. Pack. Amer. J. Roentgen. 99(4):851-862, 1967.

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noguanidine sulfate produced hepatic necrosis
n admin. to the chick embryo during the fourth-
th day of fertilization. A small segment of
liver parenchyma was spared this effect and
sented a tubular or multicystic appearance when
died by light microscopy. Using light and
ctron microscopy it was shown that these cystic
uctures were greatly dilated bile canaliculi
ch were lined by large numbers of embryonic
atocytes. No mitotic activity was demonstrated
any liver element until the end of the second
of fertilization, after which the normal liver
ucture was rapidly reconstituted. It is sug-
sted that the effect of aminoguanidine sulfate
on all liver cells is a prolonged mitotic in-
ition and that the canalicular cysts result
om failure of normal formation of the bile
inage system.

55 THROMBOSIS OF HEPATIC VEINS ACCOMPANYING
CARBON TETRACHLORIDE INDUCED CIRRHOSIS.
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over. Arch. Path. (Chicago) 83(3):267-270, 1967.

ffalo strain inbred male and female rats (4 days,
wk., 12 wk., 24 wk. and 52 wk. old) were inj.
c. with CCl4 twice/wk. for 12 wk. Cirrhosis of
e liver and hepatic vein thrombosis developed.
rombosis occurred in older rats more frequently
an in younger rats, and it was also present in
les more often than females. The thrombosis
peared to be initiated by proliferation of
nous endothelial cells. It is suggested that
e proliferation resulted from toxic damage to
e venous endothelium by the CCl4.

56 AN ATTEMPT AT EVALUATION OF THE EFFECT
OF ACUTE ETHANOL INTOXICATION ON THE
IVER FUNCTION ON THE BASIS OF CERTAIN ENZYMATIC
ESTS. (Pol.) Łukasik, S. (3rd Clinic Intern.
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e activity of 6 enzymes (SGOT, SGPT, phospho-
xose-isomerase, aldolase, alkaline phosphatase,
d gamma-glutamyl-transpeptidase) was slightly
gher in the serum of 27 patients with acute
hanol intoxication when compared with 90 healthy
bjects, but the difference was not statistically
gnificant. The difference was even less pro-
unced when a subgroup of nonalcoholics (15) and
coholics (12) was compared with the group of
althy subjects and a group of patients treated
r chronic alcoholism (110). The increase in mean
alues depends on a pronounced increase of this
ctivity in a small number of cases and not on
he increase of activity in the entire group,
as was shown by the evaluation of this material
by the elimination of individual results. These findings do not support the opinion that an increase in hepatic enzyme activity is caused by acute ethanol intoxication through its hepatotoxic action. The high enzyme activity in this group is due to a high frequency of hepatobiliary diseases; e.g. 6 previously had jaundice and 3 showed active inflammatory process in the liver or bile tract at the time of the study.

6457 THE EARLY STAGE OF LIVER INJURY IN THE ALCOHOLIC. (E.) Edmondson, H. A. (U. Southern California Sch. Med., Los Angeles), R. L. Peters, H. H. Frankel and S. Borowsky. Medicine (Balt.) 46(2):119-129, 1967.

Chronic alcoholic patients (100) without evidence of cirrhosis were studied at the time of an episode of acute alcoholism; 6 patients died, each of a different complication unrelated to alcoholic liver disease. The frequency of serum electrolyte deficiency was high and should be considered as a possible factor in sudden death. Liver biopsy specimens were obtained from 45 patients; microscopically, although fatty change was present in over 90%, there was a lack of severe hepatic alterations. More than 33% of the patients had swollen hydropic liver cells that were characterized by organelle disorganization when studied by electron microscope. Approx. 50% of the patients had some centrilobular intrasinusoidal collagen which appeared to originate in the spaces of Disse, but which could often be found in the intercellular spaces by electron microscopy.

6458 EFFECT OF ETHANOL ON RAT LIVER. III. LIPID COMPOSITION OF LIVER MITOCHONDRIA FROM RATS AFTER PROLONGED ALCOHOL CONSUMPTION. (E.) Lundquist, C. G. (St. Gorans's Hosp., Stockholm, Sweden), K. H. Kiessling and L. Pilstrom. Acta Chem. Scand. 20(10):2751-2754, 1966.

Long-term feeding of ethanol to rats influences liver lipid metabolism and the structure and function of the liver mitochondria. Mitochondrial lipids were quantitatively determined to see if the disturbed lipid metabolism changed the lipid composition of the liver mitochondria. There was a slight but nonsignificant decrease in the content of phospholipids and an increase in that of neutral lipids in mitochondria from alcohol-treated (ethanol, 15% (vol./vol.) soln. admin. over 8 mo.) rats (13), as compared with controls (10). Composition of the phospholipid fraction was almost identical in the 2 groups of animals.

6459 PROTEIN ANABOLISM AND FATTY LIVER OF THE ALCOHOLIC. (E.) Jabbari, M. (New Jersey Coll. Med., East Orange) and C. M. Leevy. Medicine (Balt.) 46(2):131-139, 1967.

Synthetic androgenic-anabolic steroids in large doses prevented ethanol-induced deposition of liver fat and facilitated its mobilization in Sprague-Dawley rats and man. Synthesis of nuclear RNA and repair of agranular reticulum which results from such therapy was associated with an increase in hepatic output of triglyceride. These results are interpreted as indicating damage of the agranular reticulum, reversible with appropriate therapy, as an important factor in the pathogenesis of fatty liver of the alcoholic. In spite of their potential toxicity, synthetic androgenic-anabolic steroids are useful adjuncts in the management of alcoholic patients with hepatic steatosis. Further studies are advocated to discover the mechanism for untoward effects of these drugs and modify their chemical structure so as to provide desired anabolism without untoward effects.

6460 PATHOCHEMICAL CHANGES IN AN EXPERIMENTAL HELIOTROPE-INDUCED LIVER DYSTROPHY. (Rus.) Abdullaev, N. K. (Uzbek Inst. Reg. Med. Tashkent, USSR). *Vop. Pitan.* 25(5):69-74, 1966.

Admin of heliotrine, (s.c.), an alkaloid obtained from *Heliotropium lasiocarpum* seeds, induced liver dystrophy in albino rats (180-200 g). The alkaloid was inj. daily during a period of 25 days (20, 15, and 10 mg per rat and day during the first week, the second week, and the remaining days, resp.). Some of the animals were harvested immediately after the last inj., some 20 days later. The metabolic changes induced by the alkaloid in the liver and in the serum of rats were characterized by biochemical methods. Livers of rats harvested immediately after the last inj. of heliotrine contained markedly less glycogen and β-lipoprotein, but more total lipids than those from healthy animals. Admin. of the alkaloid decreased also the autolipolytic and the esterolytic activity of the liver. On the other hand, the lipolytic activity of the fat tissue was increased in treated animals, leading to an increase of the level of nonesterified fatty acids in the serum. The β-lipoprotein content of the serum was higher in treated then in untreated animals. Thus the heliotrine-induced liver dystrophy leads to fatty infiltration of the liver. However, the accumulation of the fat is suppressed by increased excretion of the β-lipoproteins from the liver. The disease is accompanied also by inhibition of protein synthesis and markedly reduced respiration of the liver tissue. A similar pattern was observed also when rats were harvested 20 days after the last inj. of the alkaloid.

6461 EFFECT OF PREDNISOLONE AND OF METHANDROSTENOLONE ADMINISTRATION ON PATHOCHEMICAL SHIFTS IN EXPERIMENTAL HELIOTRINE HEPATITIS. (Rus.) Abdullaev, N. K. (Uzbek Inst. Reg. Med., Tashkent, USSR). *Probl. Endokr. Gormonoter.* 12(6):71-75, 1966.

The s.c. admin. of heliotrine, for a period of 25 days (20, 15, and 10 mg every second day to each rat during the first wk., the second wk., and the remaining days resp.), induced hepatiti
in white rats; it was manifested 20 days after the last inj. by decreased glycogen, protein, a
β-lipoprotein content, increased total lipid content, reduced autolipolytic activity and decreased respiration of the liver tissue. The changes were accompanied by increased lipolytic activity of the fatty tissue, and an increase in the levels of nonesterified fatty acids and β-lipoproteins in the serum, as well as by hypo
proteinemia. When rats poisoned by heliotrine were treated for 20 days after the last inj. of the alkaloid by p.o. admin. of 2 mg/100 g of prednisolone every second day, the pathologi
changes in fat and glycogen metabolism and in respiration of the liver tissue were essentiall
not reversed. However, changes in protein metabolism could be partially prevented by prednisolone treatment. Treatment with methandrostenolone under similar conditions was more effective. The glycogen protein, and β-lipoprotein content of the liver markedly improved. The protein content and the compositio
of the serum also became normalized. However, pathological changes induced by heliotrine in the total lipid content of liver, in the lipoly
activity of the fat tissue, and the β-lipoprote
content of the serum were not affected by treat
ment of rats with methandrostenolone.

6462 INFLUENCE OF ETHIONINE ON RIBOFLAVIN METABOLISM. (Rus.) Cherkes, L. A. (Inst. Nutr., Acad. Med. Sci., Moscow), S. A. Ganetskaia and S. G. Aptekar. *Vop. Onkol.* 12(9
55-59, 1966.

Wistar rats were inj. i.p. with D,L-ethionine (1 mg/g of wt.) and the level of riboflavin in their urine was determined 24 and 48 hr. after inj. The excretion of urinary riboflavin was markedly higher in ethionine-treated than in un
treated animals. On the other hand, the total riboflavin and flavin adenine-dinucleotide cont
of livers decreased sharply after admin. of ethionine. However, ethionine treatment did no
affect the sum of the free riboflavin and flavi
mononucleotide contents of rat liver. It is suggested that admin. of ethionine primarily decreased the level of liver ATP. As a consequ
the level of flavin adenine-dinucleotide in the liver was reduced.

6463 ANIMAL STUDIES ON THE SENSITIVITY TO TRYPSIN OF ISOLATED NORMAL AND INJURE
LIVER CELLS. (Ger.) Emmrich, R. (Karl Marx U.
Leipzig, Germany) and J. Fehres. *Acta Hepatosp*
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Pieces of rabbit and rat liver (about 4 mm on each edge) were freed of blood by washing in phosphate and mg-free tyrode soln. The liver cells were mechanically separated; the cell suspension was centrifuged (400 rpm) and resuspended to yield a suspension of about 500,00
cells/ml. Trypsin was added to 1 ml of cell

sion so that the enzyme conc. varied in
ent preparation from 10^{-1}-10^{-10}%. After
. exposure of the cells to trypsin the
of cells intact in appearance were counted.
ver cells obtained from rabbits were of 4
ent groups: (a) Those from untreated
s; (b) Cells from rabbits sensitized by
ic inj. of human serum; (c) Liver cells
nimals poisoned with CCl_4; (d) Cells from
s poisoned with CCl_4 and sensitized to
serum. Liver cells from the rat were:
ver cells from normal rats; (2) Regenerated
cells after 70% resection of the liver,
after operation; (3) The same, 3 days
operation; (4) The same, 10 days after
ion; (5) Regenerated liver cells after 33%
ion of the organ, 3 days after operation;
lls from animals 3 days after 70% liver
ion (during the 3 days animals received
e chloride); (7) The same except the drug
was diethylstilbestrol dipropionate;
e same, except the drug (testosterone);
e same except the drug (prednisolone, solu-
in-H); (10) The same except the drug
cortone). The isolated liver cells with
damage showed a high breakdown rate but an
ged reactivity to trypsin by the intact
; sensitization to human serum did not
the rate of cellular breakdown on the
ivity to trypsin. After previous exposure
l_4 and sensitization to human serum,
ivity to trypsin was increased; however, the
down rate of the cells in suspension without
in remained normal. The liver cells on
hird day after 70% resection showed the
est natural reactivity to trypsin. Diethyl-
estrol dipropionate and prednisolone can-
d this increased sensitivity to trypsin. The
cal conc. of trypsin was between 10^{-4} and
g%; at the former conc. the cells were
ed; at the latter conc. all cells seemed
l.

NEGATIVE CORRELATION BETWEEN THE HEPATIC
CONCENTRATIONS OF ATP AND PORPHYRINS IN
AT INTOXICATED BY SEDORMID. (Fr.) Gajdos, A.
l Dieu, Paris), M. Gajdos-Torok, A. Palma-
s and L. Palma-Carlos. C. R. Soc. Biol.
s) 160(5):953-957, 1966.

ative correlation was found to exist between
ic levels of ATP and porphyrins. Four groups
ite female rats (about 200 g) were treated
llows: Group 1, normal controls; Group 2-4,
ls each received 400 mg/kg body wt. of
mid (allylisopropylacetylcarbamide)/day
days by gastric intubation. The animals
oup 2 were killed the day following the last
of Sedormid; the livers were immediately
ed and analyzed for ATP and porphyrins; those
oup 3 were kept for 2 days after the Sedormid
tment before being sacrificed, and the liver
zed in the same way; Group 4 remained for
ys after Sedormid prior to sacrifice and
sis. The av. values expressed as µM of
and as µg of free porphyrins/100 g of fresh
liver tissue were: Group 1 (controls), ATP 230; porphyrins 6.7; Group 2, ATP 150, porphyrins 73;. Group 3, ATP 185 porphyrins 28.0; Group 4, ATP 211, porphyrins 13.2. The comparison of the normal animals and those in Group 2 shows a significant negative correlation. In other animals, after the results reported above, the urinary excretion of δ-amino Levulinic acid, porphobilinogen, uro-and coproporphyrins was controlled without producing such wide differences in hepatic retention of porphyrins. Moreover, during the time when animals were under the influence of Sedormid and the hepatic conc. of porphyrins increased there was increased urinary excretion of porphyrins so that increased hepatic porphyrins did not result from decreased kidney excretion of these compounds.

6465 CLINICAL AND ANIMAL STUDIES ON THE LIVER TOLERANCE OF A SOPORIFIC COMPOUND. (Ger.) Clodi, P. H. (U. Vienna, Austria), H. Schnack and F. Wewalka. Wien. Med. Wschr. 49(116): 1072-1075, 1966.

The suitability of a nonbarbiturate sleeping compound (2-methyl-3-tolyl-4-oxybenzdiazine), Mozambin (M), with respect to its use by patients with liver disease was tested using the excretion of BSP as an index of liver function. The excretion of the dye av. 74% of the amount inj. in 90 min. in 16 normal rats; the av. for 8 rats after 350 mg Mozambin was 73%. Inj. of CCl_4 decreased BSP excretion; doses of 200 and 800 mg Mozambin did not significantly change the rate of dye excretion. The compound was admin. to patients with liver disease (200-400 mg/day p.o., or, 150 or 300 mg i.m.) for periods of 4-24 days; suppositories were also tried. The following determinations were made before and after treatment with Mozambin: (1) serum bilirubin level, (2) SGOT, and (3) leucine aminopeptidase. In almost all cases treated for more than 10 days with Mozambin, thymol turbidity, serum albumin and globulin were measured. Patients (15) were given the BSP test. The test groups comprised (1) cases with different internal diseases such as hypertension, bronchial asthma, spondylosis and illness after hepatitis, (2) cases with active liver diseases, (3) patients with compensated and decompensated liver cirrhosis, (4) patients with decompensated liver cirrhosis treated with Mozambin for longer periods of time and under the usual therapy for cirrhosis (vitamins and anabolic steroids), (5) cases with malignant tumors, (6) cases of acute hepatitis. Altogether 43 patients were tested. No effect of Mozambin was discovered upon the parameters studied nor on the RBC count. The mild hypnotic action of Mozambin can be used in treatment of patients with liver disease with favorable reactions. It should not be used when the patient is mentally disturbed.

6466 INFORMATION ON COMPARATIVE LEVELS OF HEPATIC ENZYMES, WITH PARTICULAR REFERENCE TO OCT AS AN INDEX OF THE HEPATOTOXICITY OF ANTIBIOTICS. (Fr.) Brette, R.

(Edouard-Herriot Hosp., Lyon, France), R. Truchot, J. F. Bolot and Y. Counitcansky-Cille. Rev. Int. Hepat. 16(7):1275-1291, 1966.

Liver function tests were performed before and after 6 days of antibiotic therapy in 88 patients. Spiramycin (3 g/day p.o.; 12 cases) had no effect on liver ornithine carbamyl transferase (OCT) levels; oleandomycin (3 g/day p.o.) and oxytetracycline (2.5 g/day p.o.) induced moderate increases in 1 of 8 and 1 of 10 cases, resp. A moderate increase in already elevated OCT levels was seen in 1 of 12 patients admin. penicillin G (2 million U/day i.m.). Significant increases in OCT activity were seen in 9 of 10 patients admin. erythromycin (3 g/day p.o.), 3 of 17 admin. tetracycline HCl (2.5 g/day p.o.), 2 of 9 admin. dihydrostreptomycin pantothenate (1.5 g/day i.m.), and 2 of 8 admin. colimycin (6 million U/day i.m.); these agents are known to be toxic to the liver, but no clinical signs of toxicity were noted. OCT proved much more sensitive than other liver function tests; none of the patients showed abnormal LDH, SGOT, SGPT, serum iron or bilirubin values.

6467 EXPERIMENTAL STUDIES ON THE HEPATIC EFFECTS OF TETRACYCLINE.

(E.) Miller, S. E. P. (West. Infirm., Glasgow, Scotland), R. N. M. MacSween, A. C. A. Glen, K. Tribedi and F. M. L. Moore. Brit. J. Exp. Path. 48(1):51-57, 1967.

Tetracycline was admin. by perfusion of the lateral tail vein to groups of 12 rats in doses of 100, 200 and 300 mg over a period of 30-40 min. followed by animal sacrifice 18 hr. later (Group 1) or similar groups were perfused for 24 hr. to total dosages of 30, 60, 120 and 140 mg and then either sacrificed at 6 hr. or 24 hr. (Groups 2 and 3 resp., half in each time period) after termination of tetracycline admin. In addition single i.m. inj. of tetracycline were admin. to 2 groups in doses of 100 and 200 mg, resp., and the rats were killed 18 hr. after inj. Control animals were admin. saline by similar routes and in corresponding doses. Histologic examination of rat parenchymal cells revealed a cytoplasmic vacuolation effect (either numerous and small or few and larger) concentrically arranged around the nucleus and observable throughout the lobule; pronounced fragmentation of the cytoplasm of mid-zone cells (confluent effect) and liver cell necrosis (focal to extensive). Employing fluorescent technics, tetracycline was demonstrated in the vacuoles of Group 2 rats but not in Group 3 rats. In single inj. studies, marked changes were produced even at the lowest dosages (100 mg/kg). Only 1 rat survived 18 hr. (liver showed confluent effect) and 9 rats died overnight (4 without liver cell changes) in the highest dose (300 mg/kg) group. Definite histological changes of the liver in the 24 hr. perfusion group were noted at 6 hr. with the smallest dose (30 mg/kg) and were time- and dose-dependent. Both SGPT and serum ornithine-carbamyl-transaminase activities increased after single inj. in dose-dependent fashion and thus indicated liver cell damage. SGPT significantly increase in all perfusion studies, except for 60 mg dose while no elevation of the serum ornithine-carba transaminase levels were noted after perfusion.

6468 CYTOPHOTOMETRIC AND CYTOCHEMICAL STUDIES ON THE EFFECT OF ACTINOMYCIN D AND THIOACETAMIDE ON RAT LIVER CELLS.

(E.) Vorbrodt, A. (Inst. Oncol., Gliwice, Poland), K. Vorbrodt, S. Krzyzowska-Gruca, Z. Stęplewski and M. Chorąży. Arch. Immun. Ther. Exp. 14(6): 818-824, 1966.

The effect of actinomycin D (100 μg/100 g body wt.) and thioacetamide (50 mg/kg body wt.) on regenerating and nonregenerating rat liver cells was studied using cytophotometry and cytochemical methods. Cytophotometric measurement showed that actinomycin D alone did not cause any distinct changes in the nucleoli, whil actinomycin D admin. together with thioacetamide abolished the effect of the latter. Nucleolar area was reduced from 12.3 μ^2 (thioacetamide-treated cells) to 6.2 μ^2 (thioacetamide and actinomycin D), as compared to the normal value of 4.5 μ^2. The RNA content expressed in arbitra U decreased from 3.54 to 1.09 (normal value is 1.13 U). These findings suggest that the maintenance of normal functional polarity of the parenchymatous rat liver cell is under nuclear control. Both actinomycin D and thioacetamide cause some as yet unknown disturbances in the distribution of guanosine triphosphatase A activity in nuclei and nucleoli of rat liver parenchymatous cells.

6469 EFFECTS OF BUTYLATED HYDROXYTOLUENE ON THE ULTRASTRUCTURE OF RAT HEPATOCY

(E.) Lane, B. P. (New York U. Sch. Med., N. Y.) and C. S. Lieber. Lab. Invest. 16(3):342-348, 1967.

Sprague-Dawley rats (36) were pair-fed nutritio ally adequate liquid diets with or without butylated hydroxytoluene (1.7 mg/calorie on the first day, 2.2 mg/calorie on the second day, and 2.8 mg/calorie thereafter) over periods ranging from 1-24 days. An additional 18 rats received butylated hydroxytoluene, 1.4 g/kg body wt., in a single dose admin. via gastric tube and were then fed a control liquid diet. Liver specimens were obtained for examination by electron microscopy at 1, 2, 3, 6, 7 and 24 days after onset of ingestion of the agent in food; groups of 3 animals from those receiving a singl dose by gastric tube were sacrificed at 16, 24 and 48 hr. and liver specimens were similarly examined. All specimens from rats receiving butylated hydroxytoluene either in their diet or by a gastric tube exhibited a proliferation of smooth-surfaced endoplasmic reticulum within some hepatocytes. The proliferation of smooth endoplasmic reticulum was noted in 20-50% of liver cells in rats sacrificed after 1 and 2

of ingestion of the drug, in 70-80% of the
r cells in rats receiving the drug for 3-7
and in more than 50% of the hepatocytes
pecimens from animals receiving the drug
24 days. From 20-50% of the cells in
imens from rats sacrificed 1-2 days after a
le dose showed the change; and at 16 hr.,
tered cells ranging up to 15% of those ex-
ed showed proliferation of granular endo-
mic reticulum. All liver specimens obtained
ng the first 3 days of continuous drug in-
ion or in the 2 days after admin. of a single
e dose by gastric tube exhibited an increase
eterochromatin aggregated about the nucleus,
compared to control samples from untreated
er mates. Increased mitotic activity also
seen in two-thirds of the samples after 1-4
of continuous ingestion of butylated hydroxy-
ene. No period of peak activity was noted.
ncrease in mitotic activity was seen in rats
n a single dose of the agent by gastric tube.
effects of butylated hydroxytoluene differed
those of other drugs in that its repeated
n. resulted in both increases in hepatocytic
nular endoplasmic reticulum and in enhanced
tic activity.

IRON-LOADING, FIBROSIS, AND HEPATIC
CARCINOGENESIS. (E.) Dunn, W. L. (U.
ish Columbia, Vancouver, Canada). Arch. Path.
cago) 83(3):258-266, 1967.

subjected to massive doses of parenteral Fe
ran, or to splenectomy, as a means of producing
tic siderosis, did not show obvious enhance-
of the cirrhosis, or alteration in the rate
ppearance or final incidence of hepatomas
fed a diet containing DL-ethionine for
ods up to 10 mo. Both massive overloading
splenectomy resulted in increased Fe storage
rabeculae, Kupffer cells, liver lobules and
nerative nodules, being more pronounced in
former. Isolated atypical liver cells were
n noted in "survival zones" about early foci
ecrosis. Their possible relationship to
later regenerative nodules, to eventual
tocarcinoma and to the residual cirrhosis is
cussed.

ROLE OF INTESTINAL MICROORGANISMS IN
DETERMINING CYCASIN TOXICITY. (E.)
z, M. (NIH Bethesda, Md.), D. W. E. Smith,
. McDaniel and G. L. Laqueur. Proc. Soc. Exp.
. Med. 124(3):691-697, 1967.

role of intestinal bacteria in converting the
rally occurring glucoside cycasin to its
inogenic and hepatotoxic aglycone (methyl-
ymethanol) was studied. Germfree male
ague-Dawley rats, in which cycasin is nontoxic,
monocontaminated with Streptococcus fecalis,
obacillus salivarius salicinius or L. salivar-
salivarius before intragastric admin. of cyca-
(750 mg/kg body wt., which is considerably
er than the LD_{50} for this strain of rats).
Levels of glucosidase activity in the bacteria were determined by assay of cell-free extracts, using cycasin as a substrate. The toxicity of cycasin in rats given the various bacteria and the amounts of unchanged cycasin excreted were consistent with the glucosidase assays. Monocontamination of germfree rats with S. fecalis resulted in a striking reduction in cycasin excretion, and microscopic examination of livers of these rats showed severe centrilobular hemorrhagic necrosis. A definite but less impressive reduction in cycasin excretion occurred in rats monocontaminated with L. salivarius salicinius; liver sections of these animals showed mild evidence of injury consisting chiefly of loss of cytoplasmic basophilia and occasional necrotic parenchymal and Kupffer cells. Rats monocontaminated with S. fecalis which received cycasin on the fifth day after inoculation excreted more than twice as much cycasin as those monocontaminated for 7 days; this illustrates the importance of allowing sufficient time for intestinal colonization of germfree rats by a monocontaminant. It is concluded that intestinal microorganisms deglucosylate cycasin to yield the toxic aglycone, and that variations in the intestinal flora probably play a role in determining the toxicity of ingested cycasin.

6472 LYMPHATIC CAPILLARIES OF THE LIVER IN CONDITIONS OF RADIATION AND SURGICAL INJURY IN EXPERIMENTAL CONDITIONS. (Rus.) Ogii, P. E. (Ternopol Med. Inst., USSR). Klin. Khir. (Kiev) (3):28-33, 1967.

6473 NUCLEAR FATTY ACIDS IN LIVER OF RATS SUBJECTED TO WHOLE-BODY IRRADIATION. (It.) Slaviero, G. E. (U. Pavia, Italy), E. Bobbio Pallavicini and A. Zanetti. Minerva Radiol. 12(3):90-94, 1967.

6474 CYTOPLASMIC FATTY ACIDS OF LIVER IN RATS SUBJECTED TO WHOLE-BODY IRRADIATION. (It.) Bobbio Pallavicini, E. (U. Pavia, Italy), G. E. Slaviero and A. Zanetti. Minerva Radiol. 12(3):94-96, 1967.

6475 DISTURBANCES OF LIVER FUNCTION AND PORPHYRIN METABOLISM IN LEAD TETRAETHYL POISONING. (Pol.) Koziołowa, H. (1st. Intern. Dis. Clin., Warsaw). Pol. Arch. Med. Wewnet. 38(3):371-377, 1967.

6476 ALDOLASE AND CARBAMYL-ORINTHINE TRANSFERASE AFTER INTRALIENAL OXYGEN APPLICATION IN EXPERIMENTAL TRAUMATIC SHOCK IN DOGS. (E.) Cygan, Z. (Silesian Sch. Med., Zabrze-Rokitnica, Poland), S. Ziarek, M. Drożdż, Z. Antoszewski and S. Zegleń. Acta Physiol. Pol. 17(1):65-69, 1966.

6477 ENZYME DIAGNOSIS AND CLINICAL PICTURE OF REINFARCTION AND POSTINFARCTION LIVER DAMAGE. (Ger.) Schneider, K. W. (U. Clin. Wurzburg, Germany) and F. G. Lehmann. *Verh. Deutsch. Ges. Inn. Med.* 72:914-925, 1967.

6478 N-HYDROXYLATION OF THE CARCINOGEN 2-ACETYLAMINOFLUORENE BY HUMAN LIVER TISSUE *IN VITRO*. (E.) Enomoto, M. (U. Tokyo) and K. Sato. *Life Sci.* 6(8):881-887, 1967.

6479 THIORIDAZINE-INDUCED CHOLESTASIS. (E.) Barancik, M. (950 E. 59th St., Chicago, Ill.), L. L. Brandborg and M. J. Albion. *J.A.M.A.* 200(1):69-70, 1967.

6480 PREOPERATIVE AND POSTOPERATIVE HEPATIC DYSFUNCTION. (E.) Dykes, M. H. M. (U. Rochester Sch. Med., N. Y.) and S. G. Walzer. *Surg. Gynec. Obstet.* 124(4):747-751, 1967.

6481 FATAL HEPATITIS PROBABLY DUE TO INDOMETHACIN. (E.) Kelsey, W. M. (Bowman Gray Sch. Med., Winston-Salem, N. C.) and M. Scharyj. *J.A.M.A.* 199(8):586-587, 1967.

6482 EFFECT OF HYDRAZINE ON DNA CONTENT OF THE LIVER. (E.) Banks, W. L., Jr. (Brooks Air Force Base, Tex.), D. A. Clark and E. R. Stein. *Proc. Soc. Exp. Biol. Med.* 124(2): 595-599, 1967.

6483 EFFECT OF ANTIBIOTIC AEROSOLS ON THE PROTHROMBIN-FORMING FUNCTION OF THE LIVER. (Rus.) Tal'iantsev, P. I. (Inst. Sanitation-Health, Moscow) and I. F. Nikonets. *Vrach. Delo* (3):75-76, 1967.

6484 HISTOLOGIC LIVER LESIONS AFTER HALOTHAN AND ETHER ANESTHESIA. (Pol.) Szydłows Z. (1st Surg. Clin., Wroclaw, Poland), Z. Rzucid Z. Zagrobelny and J. Doliński. *Pat. Pol.* 18(1): 79-86, 1967.

6485 ACUTE POSTOPERATIVE LIVER DAMAGE WITH PARTICULAR REFERENCE TO HALOTHANE. COMPARATIVE MORPHOLOGIC AND CLINICAL STUDIES. (Ger.) Jansen, H. H. (U. Heidelberg, Germany), B. Brehmer, K. H. Grözinger and H. Stoeckel. *Langenbeck. Arch. Klin. Chir.* 317(2):96-116, 1967

See also abstract no.: 5799

6 PRELIMINARY RESULTS OF STUDIES ON THE
APPLICATION OF THE INTRADERMAL TEST
H GAMMA GLOBULIN IN VIRUS HEPATITIS. (Pol.)
uness, W. (2nd Surg. Clin. Lublin, Poland),
Bierut, T. Franczak, H. Gawronowa, C. Horoch,
Kornas, I. Mierzejewska, E. Szymanek, Z.
ski and H. Zochowska. Pol. Tyg. Lek. 21(44):
9-1682, 1966.

radermal test with 15% human gamma globulin
admin. to 998 persons (452 males, 546 females;
up to 14 yr., 520 of 998; 15-more than 50 yr.,
of 998), of whom 669 received at the same time
ontrol test (20% human albumin). Erythema and
iltration 10 or more mm in diameter were
sidered to be a positive reaction. In 13 of
patients with viral hepatitis the positive
aneous reaction was confirmed equally with
gamma globulin and the control and thus were
evaluated. Control tests were negative in
of the cases. Of 299 patients with viral
atitis 66.3% had a positive test. In the
ients with suspected oral and parenteral routes
infection the intradermal test was positive
m the first day of the disease. The highest
centage of positive tests was found in persons
er than 50 yr. (78%) and the lowest in children
to 6 yr. of age (53%). On the seventh day of
ease 47.8% of the cases showed positive results
after 21 days only 35.2%. Of 52 cases with
evere course of the disease 71% had a positive
ction; of 148 with a moderately severe course
5% had positive reactions; and of 91 mild
es 60.0% had positive reactions. Of 207
sons in contact with viral hepatitis patients
2% had positive reactions, which was also
nd in 6.4% of 264 healthy persons. Of 121
sons with other diseases 12.4% had positive
ctions as well as 31% of 94 persons with other
eases of the liver and biliary tract.

7 COMPARISON BETWEEN THE BEHAVIOUR OF
VARIOUS SERUM ENZYME ACTIVITIES (GUANASE
TRANSAMINASE) AND HOYT-MORRISON TEST IN
AN VIRAL HEPATITIS. (It.) Monti, G. (U.
ua, Italy), S. Pepi, P. Mazzucato and A.
liamonte. Policlinico [Prat.] 73(47):1577-
0, 1966.

values of serum guanase (Hue-Free method)
transaminase (Tonhazy method) activity and
se obtained by the Hoyt-Morrison test were
pared in 135 patients with viral hepatitis
racterized by jaundice. Positive serum
nase activity, transaminase activity, and
t-Morrison tests were observed in 93.1%,
1%, and 48.27%, resp., of 29 patients in
m jaundice appeared during days 1-10 of the
ease; 70.37%, 88.88%, and 58.14%, resp., of
patients (days 11-20); 50%, 62.5%, and 62.5%,
p., of 24 patients (days 21-30); 34.37%,
89%, and 75.86%, resp., of 29 patients (days
40); 26.92%, 30.77%, and 73.07%, resp., of
patients (days 41-50). Results indicate a marked increase in enzyme activity during the more acute periods of the disease with a gradual decrease thereafter. The decrease was more rapid in serum guanase levels, suggesting that this enzyme is a specific indicator of hepatic necrosis. On the other hand, the Hoyt-Morrison test became positive during the later phases, and the persistence of a positive reaction may be an indication of chronic progression of the disease.

6488 USE OF IMMUNOFLUORESCENCE METHOD FOR DETECTION OF ANTIGEN IN LIVER CELLS OF PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Ketiladze, E. S. (Ivanovskii Inst. Virology, Acad. Med. Sci., Moscow), E. A. Paktoris, I. V. Shakhgildian and N. N. Zhilina. Vop. Virus. 11(6):675-680, 1966.

Liver cells were collected by punch biopsy from 30 children with infectious hepatitis and were examined by the indirect fluorescent antibody method for the presence of a specific viral antigen. Liver cells collected from 15 adults with hepatitis of nonviral etiology served as control. Convalescent sera and human gamma globulin were used for detection of viral antigen. Rabbit gamma globulin containing antibodies against adenoviruses was used in control stainings. Specific antigen could be detected by both convalescent sera and human gamma globulin in livers of 9 of 15 patients with an acute form of infectious hepatitis accompanied by swelling of the liver, jaundice, and increase in the level of blood transaminases. Positive stainings were much more frequent during the early (seventh-fifteenth day after the appearance of the symptoms) than later stages of the disease. Similarly, with increasing severity of the disease the probability of the occurrence of positive staining increased. Specific fluorescence was seen exclusively in the cytoplasm. The nuclear localization of fluorescence observed with one of the samples after staining with control and anti-adenovirus rabbit gamma globulin was shown to be due to additional adenovirus infection. Specific antigens could not be demonstrated in liver cells collected from children with a chronic form of disease or from adults with nonviral hepatitis after treatment with convalescent sera or human gamma globulin.

6489 INVESTIGATION OF VIRUSES ISOLATED FROM PATIENTS WITH BOTKIN'S DISEASE AND THEIR CONTACTS. (Rus.) Nuromskaia, O. A. (Med. Inst., Lugansk, USSR). Vop. Virus. 11(6):721-724, 1966.

Blood samples (148), 192 samples of feces, and 195 samples of nasopharyngeal washings, collected from patients with epidemic hepatitis and from their contacts, were examined for the presence of specific complement fixing antibodies. Cultures of D-6 cells were inoculated with positive samples. The nasopharyngeal washings and blood samples were heated at 56°C for 30 min. before inoculations. Of 57 cytopathic agents isolated and carried through 7 subsequent passages, 9 were derived from nasopharyngeal washings, 19 from feces and 29 from the blood. The titers of the isolated agents (extra-plus intracellular) were $10^{2.5}$-$10^{3.5}$, $10^{1.0}$-$10^{1.5}$, and 10^{0}-$10^{0.5}$ TCID$_{50}$ (tissue culture inhibitory dose) per 0.1 ml in D-6, HEp-2, and HeLa cell cultures, resp. The level of intracellular virus was much higher than that of extracellular. The agents were not inactivated by heating at 56°C for 30 min., were not sensitive to treatment by ether, agglutinated rat RBC in low dilutions, and did not multiply in embryonated eggs. They were not neutralized by anti-Coxsackie B (types 1-6), anti-ECHO (types 1-29), and anti-polio (types I-III) sera. Convalescent sera collected from patients who had infectious hepatitis neutralized these agents in dilutions up to 1.8-1.16. All agents isolated showed positive complement fixation reaction with anti-adenovirus sera. This fact indicated that the agents may be antigenically related to adenoviruses.

6490 THE COURSE OF DIABETES MELLITUS IN EPIDEMIC HEPATITIS.

(Rus.) Moskovich, E. G. (Botkin City Clin. Hosp., Moscow) and K. L. Tregubova. Probl. Endokr. Gormonoter. 12(6):40-43, 1966.

The course of diabetes mellitus was studied in 50 patients with infectious hepatitis (Botkin's disease). Forty patients already had diabetes before the appearance of hepatitis symptoms, while in 10 of them diabetes developed after these symptoms appeared. In the latter group of patients a latent form of diabetes was apparently activated by the hepatitis or in individuals with affected insular apparatus, possibly by glucocorticoids used for treatment of hepatitis. None of the forms of diabetes mellitus developed during hepatitis were resistant to insulin. As a rule, infectious hepatitis increased the severity of diabetes mellitus, necessitating treatment with increased doses of insulin or use of insulin in patients who were not treated with it before hepatitis. It is concluded that diabetes mellitus is not a contraindication for glucocorticoid treatment in infectious hepatitis.

6491 DIAGNOSTIC AND PHYSIOPATHOLOGICAL SIGNIFICANCE OF CHANGES IN SERUM POLYPEPTIDASE ACTIVITY IN CHRONIC HEPATITIS.

(Rum.) Dragomirescu, M. (Contagious Dis. Clin., Inst. Med., Timisoara, Rumania) and L. Dragomirescu. Med. Intern. (Bucur.) 18(10):1173-1178, 1966.

Serum polypeptidase changes in patients with epidemic hepatitis and obstructive jaundice (lithiasis) were investigated by titrimetric and colorimetric methods (451 determinations). The latter technic was found to be far superior (diagnostic index = 92.4%, as against 76% for the titrimetric method). Also, the values obtained with the colorimetric method paralleled those
obtained in determinations of serum proteolyt
enzymes and SGPT titers in viral hepatitis.
is concluded that while the diagnostic and
prognostic value of the colorimetric method
superior, both methods reflect the progressic
of hepatic lesions.

6492 STUDY OF THE METABOLISM OF TRYPTOPH IN DIFFERENT HEPATO-DIGESTIVE DISEA I. VIRAL HEPATITIS.

(Fr.) Lemonnier, F. (S
Antoine Hosp., Paris), C. Charpentier, B.
Chevrel, A. Lemonnier and J. Caroli. Rev. Fr
Etud. Clin. Biol. 12(1):71-77, 1967.

Tryptophan metabolism (5 g p.o.) was studied
38 occasions in 16 patients in various stages
viral hepatitis. In 12 tests, significant
abnormalities were seen: increased kynurenin
and acetylkynurenin excretion (11), increased
excretion of free or conjugated hydroxykynure
anthranilic acid or kynurenic acid (7 each),
and increased hydroxyanthranilic acid (1 test
but xanthurenic acid was normal on 11 of 12
occasions. In 10 tests the excretion pattern
were similar but changes were less marked
(described as "subnormal" excretion tests);
the other 16 were normal. During the first
after the onset of jaundice, when the SGOT ar
SGPT levels were elevated (usually markedly)
3 of 11 tryptophan loading tests were normal
were abnormal and 2 were subnormal. After 3
of evolution, when the transaminases were st
elevated, 3 of 10 tests were abnormal, 3 were
subnormal and the others were normal. After
about 30 days, only 1 of 10 tryptophan tests
was abnormal (the others were normal or subn
in these patients the transaminases were sti
elevated but beginning to decrease. The tryp
phan loading test did not afford a direct mea
ment of liver cell damage. The principal me
bolic anomaly in the acute stages of infecti
hepatitis seemed to be in the transformation
kynurenin into hydroxykynurenin.

6493 INVESTIGATIONS ON URINARY EXCRETIO ACID MUCOPOLYSACCHARIDES IN THE CO OF VIRAL HEPATITIS AND THEIR CLINICAL SIGNIF

(Pol.) Stempień, R. (Infect. Dis. Clin., Lo
Poland), E. Schmidt and L. Tomaszewska. Pol
Tyg. Lek. 21(44):1686-1689, 1966.

Daily urinary excretion of acid mucopolysacc
studied on 111 patients (mostly males; age 2
yr.) showed (in 50 patients with viral hepat
without coexisting diseases) an av. value of
7.90 mg% (expressed as glucuronic acid), as
compared to 40 controls (age 20-70 yr.) with
6.25 mg%. In 32 patients with prolonged hep
tis, after viral hepatitis, and liver cirrho
the acid mucopolysaccharide excretion was in
creased showing an av. value of 21.0 mg%/day
In 15 patients with viral hepatitis and pulm
tuberculosis the av. daily excretion was 16.
and in 12 patients with viral hepatitis and
diabetes the value was 17.1 mg%. In half th

nts with viral hepatitis and rheumatic
se the av. daily excretion was 18 mg% and
hers 93 mg%.

BLOOD FRUCTOSE AND INORGANIC PHOSPHORUS
AFTER ORAL SUCROSE LOAD AS AN INDEX OF
OSE METABOLISM. DISTURBANCES OF FRUCTOSE
OLISM IN PATIENTS AFTER VIRAL HEPATITIS.
) Poznańska, H. (2nd Infect. Dis. Clin.,
w). Pol. Tyg. Lek. 21(40):1521-1524, 1966.

ose curves after oral loading with sucrose
determined in 20 of 51 patients with a history
ral hepatitis 2-3 yr. earlier. At the time
lease 8 of 20 showed normal fructose curves,
20 had varying curves and 4 of 20 pathologic
s. One patient was released during hormonal
py with a probable influence on the normal
e of the fructose curve in spite of symptoms
ffuse hepatic inflammation; however, a check-
owed a pathologic fructose curve. At
up the fructose curve was normal in 7 of 8
of 7, resp., pathologic in 1 of 8 and 3 of 4,
, and varying in 1 of 4. Besides these, 14
nts were examined who had viral hepatitis
mo. earlier and fructose curve was not
mined during hospitalization. Four showed
l fructose curves and no additional or
cal changes were evident; 7 showed varying
s, of whom 5 had slight hypoalbuminemia
6%), 1 slightly increased thymol test; 3
d pathologic curves. Therefore normal
ose curves upon discharge remained normal,
ng curves became normal, and pathologic curves
ned so in some patients. Pathologic curves
usually accompanied by slight abnormalities
rtain functional liver tests. Therefore the
fructose curve after oral loading with
se is a very sensitive index of functional
rbances of the liver cell.

THE EFFECT OF PREDNISONE ON VENOUS
PRESSURE IN VIRAL HEPATITIS. (Pol.)
ński, B. (1st Intern. Dis. Sch., Warsaw).
Tyg. Lek. 21(44):1696-1697, 1966.

s pressure was measured in 23 patients with
hepatitis, of whom 21 were treated with
rate doses of cortisone (30-50 mg/day) and
high doses (100-200 mg/day). Measurements
made before treatment with cortisone at 48
44 hr. of treatment, at the third day reduc-
of dose, at discontinuation of treatment and
scharge. It was found that cortisone norma-
venous pressure in the patients with viral
titis. A normalization of the serum protein
tion was observed also, when compared to the
nts not treated by cortisone. One of 2
nts treated by large doses of cortisone died
autopsy revealed renal tumor with metastases
ungs and brain.

CHRONIC ACTIVE HEPATITIS TREATED WITH
6-MERCAPTOPURINE. SUSTAINED REMISSION.
(E.) Geenen, J. E.(Racine Med. Clin., Wis.),
G. T. Hensley and D. H. Winship. Ann. Intern.
Med. 65(6):1277-1283, 1966.

The histological, biochemical and clinical aspects of chronic active hepatitis in a 21-yr.-old Caucasian housewife were observed over a 3-yr. period; her response to glucocorticoids and 6-mercaptopurine was documented with serial liver function tests and liver biopsies. On 2 occasions, the patient was given p.o. prednisone (first, 60 mg/day, tapered over an 8-mo. period to 10 mg/day; second, 30 mg every other day, increased to 30 mg/day, and then gradually decreased over 4 mo. to 15 mg/day), but relapsed after its withdrawal. The patient was then given 6-mercaptopurine (200 mg/day, gradually decreased over a 3.5-mo. period to 100 mg/day), which was discontinued 10.5 mo. after its initiation because of pregnancy. This invoked a sustained remission after 2 yr. of active hepatic disease, and 6 mo. after cessation of therapy the disease had not relapsed. This is the first reported case of well-documented chronic active hepatitis in which remission lasted longer than 6 mo. after termination of purine analog therapy.

6497 POSTSPLENECTOMY VIRAL HEPATITIS. (E.)
Stone, H. H. (Emory U. Sch. Med.,
Atlanta, Ga.), D. G. Stanley and R. H. DeJarnette.
J.A.M.A. 199(11):851-853, 1967.

During an 18-yr. period, 382 patients underwent splenectomy for various indications (with a mortality rate of 21.5%), 8 of 82 deaths after splenectomy were definitely attributed to a fulminant form of viral hepatitis, which usually occurred between the fourth and tenth wk. after operation. There were only 2 survivors out of 10 in whom viral hepatitis developed within a 6-mo. period after splenectomy (80%) mortality). Of 434 total cases of infectious hepatitis during the 18 yr. period, there were 30 deaths (6.9%) mortality). For serum hepatitis mortality was 21.4% (27 deaths) in a series of 126 patients; 8 of the 27 deaths occurred in patients who had undergone splenectomy within the 6-mo. period before onset of hepatitis. The incubation period in 5 of these 8 patients was lass than 6 wk. and could therefore represent the transfusion of infectious hepatitis virus rather than serum hepatitis virus in the admin. blood. In an experimental study of viral hepatitis in weanling (18-22 day old) mice, mortality was increased 2.5 times by performance of splenectomy before virus inoculation. It is postulated that the spleen does serve in some type of protective capacity against the hepatitis virus.

6498 VIRAL HEPATITIS IN NARCOTICS USERS.
AN OUTBREAK IN RHODE ISLAND. (E.)
Rosenstein, B. J. (601 N. Broadway, Baltimore,
Md.). J.A.M.A. 199(10):698-700, 1967.

An outbreak of viral hepatitis occurred among narcotics users in Rhode Island during the autumn of 1964 and winter of 1965. A history of i.v. drug use was elicited from 27 persons, 1 of whom had 3 distinct episodes of hepatitis; 24 of 27 were males, 17-30 yr. old, and they accounted for 30% of all reported cases of hepatitis in this age group. The majority of patients were hospitalized, but they had a mild course and there were no deaths. Eleven of 27 (41%) were not recognized initially as drug users by their attending physicians. Epidemiologic data suggested that the cause of the outbreak was the virus of serum hepatitis, and that it was transmitted by the use of contaminated inj. equipment.

6499 STUDIES ON THE TRANSMISSION OF HUMAN VIRAL HEPATITIS TO MARMOSET MONKEYS. I. TRANSMISSION OF DISEASE, SERIAL PASSAGES, AND DESCRIPTION OF LIVER LESIONS. (E.) Deinhardt, F. (Presbyterian-St. Luke's Hosp., Chicago), A. W. Holmes, R. B. Capps and H. Popper. J. Exp. Med. 125(4):673-699, 1967.

Inoculation of human sera or plasma obtained during the early phase of viral hepatitis induced chemical and morphological hepatic disease in marmosets in 2 of 5 experimental series. The disease was transmissible in series from marmoset to marmoset with an apparent increased virulence of the causative agent in later marmoset passages. Chemical evidence for the disease was elevation of the activity of SGOT and serum isocitrate dehydrogenase and of serum bilirubin. In serial liver biopsy specimens interpreted under code, a form of hepatitis, exhibiting some of the characteristics of human viral hepatitis, was readily distinguishable from nonspecific changes. The morphological changes preceded the biochemical alterations and persisted after them. These results suggest that marmosets may be susceptible to human hepatitis; if these observations are corroborated, marmosets may provide good experimental models for this disease. Final and definitive evidence that the hepatitis observed in marmosets is caused by agents of human viral hepatitis is still lacking.

6500 VIRAL HEPATITIS AMONG AMERICAN MISSIONARIES ABROAD. A PRELIMINARY STUDY. (E.) Cline, A. L., J. W. Mosley (1600 Clifton Rd., Atlanta, Ga.) and F. G. Scovel. J.A.M.A. 199(8):551-553, 1967.

The occurrence of icteric viral hepatitis among 558 American missionaries (representing 175 households) who had lived an av. of 5.7 yr. in 49 countries in Latin America, Africa and Asia between 1945-1964 and who did not receive immune globulin prophylaxis was studied retrospectively. The attack rate for all ages was 1.6%/yr.; it increased progressively from 0.6%/yr. among children under age 10 to a peak of 4.0%/yr. among those in the 20-29 yr. old group. It then decreased among older adults, but still remained higher than the level among children. There were no differences in age-specific attack rates between men and women. These findings indicate that viral hepatitis is a significant health problem among American missionaries. The pattern in relation to duration of residence abroad suggests that in order to have reduced the incidence of viral hepatitis, the admin. of immune globulin would have been required throug out the period of residence abroad.

6501 SERUM HEPATITIS AMONG SWEDISH TRACK FINDERS. AN EPIDEMIOLOGIC STUDY. (E. Ringertz, O. (Nat. Bact. Lab., Stockholm) and B. Zetterberg. New Eng. J. Med. 276(10):540-546, 1967.

During 1957-1963, 568 cases of serum hepatitis occurred among cross-country track finders (runners) in Sweden, showing an increasing numbe of cases each yr. The disease began in the west parts of Sweden and slowly spread over the whole country. The incubation period of the disease was estimated to be 90-150 days. More than 95% of the track finders received wounds or scratche during the competitions. Transmission of the disease most probably occurred by inoculation of the virus into these lesions, mainly at washi after conclusion of the competitions. The epide was terminated when, among other regulations, adequate clothing was made compulsory. During 1965-1966 another outbreak, including 42 cases, occurred shortly after these regulations had been suspended.

6502 VIRAL HEPATITIS IN A GROUP OF BOSTON HOSPITALS. III. IMPORTANCE OF EXPOS TO SHELLFISH IN A NONEPIDEMIC PERIOD. (E.) Koff, R. S. (Massachusetts Gen. Hosp., Boston), G. F. Grady, T. C. Chalmers, J. W. Mosley and B. L. Swartz. New Eng. J. Med. 276(13):703-710 1967.

During a nonepidemic period, 270 adult patients with viral hepatitis and an equal number of matched controls were studied by means of identi epidemiologic interviews designed to determine the frequency of easily recognizable and less apparent sources of transmission. Fifteen patients who admitted to narcotic addiction and 70 patients with hepatitis after transfusion had no other potential exposures more frequentl than their respective controls. In the remaini 185 the obviously important exposure to jaundice persons or patients known to have hepatitis occurred frequently; however, several less obvi potential exposures occurred so frequently in patients with hepatitis, in comparison to contr that these were thought to be significant source of nonepidemic hepatitis. These included ingestion of raw clams and oysters, contact with acutely ill but nonjaundiced children, tissue penetration by physicians and out-of-state travel. The ingestion of steamed clams was significantly more frequent in the hepatitis group, thereby suggesting a causal association between hepatitis and ingestion of cooked shellfish; ingestion of steamed clams and raw

lfish appeared to be as common a source of
ction as contact with jaundiced individuals.
ents with hepatitis admitting to narcotic
tion and those with posttransfusion viral
titis generally had an afebrile, insidious
t of illness, with infrequent preicteric,
romal symptoms. However, nontransfused,
ddict patients more frequently had abrupt
ts of illness, with fever and prodromal
toms. These clinical features were not
ific enough to identify the mode of transmis-
in the individual patient.

CHIMPANZEE-ASSOCIATED HEPATITIS. AN OUTBREAK IN OKLAHOMA. (E.) Mosley, J. W.
0 Clifton Rd., Atlanta, Ga.), H. P. Reinhardt
F. R. Hassler. J.A.M.A. 199(10):695-697, 1967.

of six persons who were in continuous physical
act with two chimpanzees developed infectious
titis. The only individual who did not
me ill had a history of a childhood disease
nosed as infectious hepatitis. The two
panzees were sent to the University of
homa 54 days and 19 days after their arrival
he United States. The animals possessed no
toms of an illness recognizable as infectious
titis. The outbreak of the disease occurred
ays after their arrival at the university.
5 cases had their onsets within a 2-3-wk.
od, suggesting a common exposure. No other
s were reported in the surrounding country
among persons handling the chimpanzees prior
hipment. Close examination failed to disclose
outside origin of the disease. Food was
lied from a common source and was also served
eople who did not contract the disease.
form organisms were not recovered from water
les. Fluorescein tests on the toilet facilities
in the animal house were negative. The pres-
evidence is considered sufficient to justify
designation of infectious hepatitis as a
mpanzee-associated" disease.

NEUROLOGIC ANC ELECTROENCEPHALOGRAPHIC CHANGES IN CHILDREN WITH INFECTIOUS
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1967.

CHANGES IN CAPILLARY RESISTANCE IN CHILDREN WITH INFECTIOUS HEPATITIS.
) Pushkar, M. S. (Kiev Med. Inst., USSR).
at. Akush. Ginek. (2):6-8, 1967.

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function studies were done on 9 patients
rrhosis of the liver; in 5, low protein-
odine and elevated triiodothyronine RBC
were found. There was no correlation
thyroid function and any of the liver
n tests. The metabolism of ^{131}I-labeled
ne and triiodothyronine was studied in 6
tients. The turnover rate of thyroxine
longed in 2 patients with liver cirrhosis,
t of triiodothyronine gave variable results
ould not be correlated with any of the
unction tests.

DETERMINATION OF FREE THYROXINE IN SERUM
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of patients with liver cirrhosis in whom
d thyroid-function tests were abnormally
compared with a similar group of patients
rmal protein-bound iodine and uptake of
the thyroid gland. The latter group had
l percentage of free thyroxine as well as
ree thyroxine iodine conc. In contrast,
s with low protein-bound iodine and ^{131}I
had an elevation in the percentage of free
hyroxine that resulted in a normal total
yroxine iodine conc. Serum free thyroxine
able in clarifying the metabolic status of
ic patients; in spite of a low protein-
odine and ^{131}I uptake, the patients de-
were euthyroid.

ERYTHROCYTE REDUCED GLUTATHIONE LEVELS
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nations of RBC levels of reduced glutathione
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els of glucose-6-phosphate dehydrogenase
rg-Horecker method) were conducted in 56
s (48 men and 8 women; age 34-69 yr.) with
is of the liver. Reduced glutathione levels
ss than normal in 19 patients; stability
s than normal in 21; phosphate dehydrogenase
were greater than normal in 14. The values
d were then compared by electronic calculator
other clinical and hematochemical parameters
r to obtain a comprehensive picture of
ients' clinical condition. Of significance
finding that reduced glutathione levels
oility were inversely proportional to serum free bilirubin levels and that phosphate dehydrogenase activity was inversely porportional to the number of RBC and to SGPT levels. The former relationship may indicate an interaction with the extensive hemolysis almost always observed in these patients.

6565 RESPECTIVE VARIATIONS IN SIDEREMIA AND SIDERURIA IN CIRRHOTICS AND ALCOHOLICS AFTER THE DESFERRIOXAMINE TEST. (Fr.) Aron, E. (Fac. Med. Pharm., Tours, France), J. D. Weill, A. Galand and M. Domenech. Arch. Franc. Mal. Appar. Dig. 55(12):1159-1166, 1966.

Desferrioxamine B methanesulfonate (Desferal; 2 inj. of 500 mg i.m., usually at a 6-hr. interval) induced no significant changes in serum or urinary Fe levels in 8 control subjects (av. before treatment 112.5 μg/100 ml and 1.382 μg/24 hr., resp.; after treatment 123.2 and 1.854 μg, resp.). In 20 patients with cirrhosis, serum and urinary Fe levels were significantly elevated (139.5 and 1.537 μg, resp.); the desferrioxamine test induced a slight but significant increase in sideruria (av. 3.823 μg/24 hr.), but did not affect serum Fe levels (av. 133.5 μg/100 ml). There was no apparent correlation between the severity of the disease and the degree of sideremia. In 8 alcoholics without clinical or biochemical signs of cirrhosis, av. urinary iron levels increased (1.288 to 2.266 μg/24 hr.) after the desferrioxamine test, while serum levels remained unchanged. This difference in iron excretion was significant, but less marked than in the cirrhotic patients. Liver biopsy studies following desferrioxamine admin. showed significant hepatosiderosis in the cirrhotic patients and less massive accumulation in the alcoholic patients.

6566 SECRETION OF PANCREATIC ENZYMES. III. RESPONSE OF PATIENTS WITH CIRRHOSIS TO SECRETIN AND PANCREOZYMIN. (E.) Zieve, L. (Minneapolis Veterans Hosp., Minn.) and B. Mulford. Amer. J. Dig. Dis. 12(3):303-309, 1967.

Pancreatic function in 34 patients with portal cirrhosis was evaluated by measuring the amount of amylase, lipase, phospholipase A, carboxypeptidase, trypsin and chymotrypsin, as well as vol. and bicarbonate conc. of the fluid, secreted into the duodenum during a 30-min. period after the onset of a simultaneous i.v. infusion of secretin (90 U) and pancreozymin (100 U). The values of these parameters were compared with those obtained from 18 normal male controls. Of the 34 men studied, 29 had portal cirrhosis with or without fatty infiltration and 5 had predominately fatty livers with or without mild cirrhosis. Two-thirds of the men had ascites on initial examination and were classified as severe; the remaining third, without jaundice or ascites, were rated as mild or moderate. All consumed excessive amounts of alcohol. Of the 29 with portal cirrhosis, 4 were operated on, 3 for portacaval shunts and 1 for relief of obstructive jaundice due to a swollen nodular pancreas. Approx. 40% of the patients had abnormally low enzyme values and bicarbonate conc. The incidence of abnormally low values was similar for all enzymes, with the possible exception of carboxypeptidase, which was depressed in 7 patients, in contrast to phospholipase A, which was low in 15 patients. Those with severe cirrhosis had significantly poorer pancreatic function, as reflected in secretion of chymotrypsin, phospholipase A and lipase, than did those with mild or moderate cirrhosis. Intercorrelations among the several enzymes measured were significantly positive but not high, similar in all respects to those previously noted in patients without cirrhosis. In two-thirds of the patients with cirrhotic livers, the vol. of duodenal aspirate obtained after infusion of secretin and pancreozymin exceeded the highest vol. previously recorded in the samples from normal men. A low vol. occurred in only 2 of 34 patients.

6567 CALIBER OF THE INFERIOR VENA CAVA IN CIRRHOSIS OF THE LIVER. (E.) Nordenström, B. (Karolinska Hosp., Stockholm) and A. Norhagen. Acta Radiol. [Diagn.] (Stockholm) 6(1):65-80, 1967.

The caliber of the inferior vena cava during respiration was studied radiologically in 13 normal subjects and in 5 with cirrhosis. Simultaneous anteroposterior and lateral views were obtained, and comparisons were made between the width of the subdiaphragmatic part of the inferior vena cava at the level of the liver (T12, or L1) and the width of the part located below the point at which the latter is joined by the hepatic veins (lower margin of L3). In both normals and cirrhotics the inferior vena cava caliber varied considerably in different respiratory phases at all points measured. Max. caliber was reached during expiration, and reflux to hepatic veins regularly occurred during expiration in normals. Caliber variations occurred in the same manner in cirrhotics as in normals, but among the former the vein at the level of the liver appeared to be relatively narrower in comparison to normals than was the portion located below the liver. A few of the cirrhotics closely resembled several normals in absolute diameter of the inferior vena cava at the level of T12 or L1. The most characteristic difference between cirrhotics and normals was the absence of reflux of contrast medium from the inferior vena cava to hepatic veins in cases of advanced cirrhosis. The function of the liver as a blood depot is probably reduced in cirrhosis and, since the liver is fibrotic, it would not be readily compressed by a downward movement of the diaphragm; therefore any evacuation of hepatic venous blood would be unlikely to be produced by respiration. A correlation factor with reference to the size of the subject, as yet undetermined, is thought to be necessary for a comparison of the inferior vena cava caliber between normals and cirrhotics; the size of the vena cava should possibly bear a relationship to the blood vol. of the subject.

6568 ACID-BASE DISTURBANCES IN PATIENTS WIT CIRRHOSIS OF THE LIVER. (E.) Malhaus R. (Minneapolis Vet. Hosp., Minn.), A. Eichenhol and A. Blumentals. Medicine (Balt.) 46(2):185-189, 1967.

A study of 91 patients with Laennec's cirrhosis showed a variety of acid-base disturbances with a reduction in partial pressure of CO_2 as a common denominator. There was an elevation of lactate and pyruvate associated with a reductio in bicarbonate ion conc. pH was in the alkaline or acid range, dependent upon the severity of the existing bicarbonate deficit in the presenc of reduced pCO_2. The mental state of the patien seemed to have no relationship to the acid-base disturbances.

6569 FUNCTIONAL RENAL FAILURE WITH CIRRHOSI THE EFFECT OF PLASMA EXPANSION THERAPY (E.) Reynolds, T. B. (U. Southern California, Los Angeles), F. L. Lieberman and A. G. Redeker Medicine (Balt.) 46(2):191-196, 1967.

Urine flow, plasma vol. and renal function, as reflected in the serum urea nitrogen or creatin clearance, were measured in 24 patients with decompensated alcoholic cirrhosis who had functional renal failure with oliguria. Plasma vol were higher than normal, but were no different from those in patients with ascites who did not have renal failure. Expansion of the plasma vo had some beneficial effect on renal function in 9 of 16, but it had no favorable influence on patient survival. The major causes of death were hepatic failure and gastrointestinal hemorrhage.

6570 ETIOLOGY AND PROGNOSIS OF LIVER CIRRH SIS. (Ger.) Piesbergen, H. (Eilbek German Hosp., Germany) and J. Jungermann. Z. Gastroent. 4(6):345-358, 1966.

Of 327 patients with liver cirrhosis, 228 were men and 99 women, a ratio of 2.3:1. [The numbe of women with cirrhosis has been increasing in Germany; the ratio of men to women in Germany in 1932 was 2.8:1; in 1962 in West Germany 1.7: and in Hamburg 1.8:1.] The av. age of 228 men was 59.7 yr. and of the 99 women, 62.7 yrs. The medical histories of cirrhosis of 150 dead patients indicated a variety of etiologies head by 55 (36.7%) with completely unknown causatio possibly anicteric hepatitis; 50 (33.3%) were due to chronic alcoholism; 36 (24%) had hepati yellow atrophy, chronic cholangitis, lues and neosalvarsan therapy occurred alone, and in combination with the other pathologies named as causes. Of 295 cirrhotic patients 113 (38. were alcoholics ranging from 21 of 21 (100%) tavernkeepers to 10 of 73 housewives (13.7%).

g 61 alcoholics who underwent laparotomy
% had fine knoblike projections from the liver
ace and 19.5% had a coarsely knobbed surface;
g the nonalcoholic patients with cirrhosis
percentages were, resp., 48.5% and 51.5%. Of
150 who died 13 (8.7%) also had diabetes.
01 autopsies, 15 cases of new ulcers were
overed, 17 instances of ulcer scars and 46
rosive gastritis were discovered. Five among
cirrhosis patients suffered ulcer hemorrhage.
death rate (percentage decreased) from time
iagnosis (expressed as yr. in parentheses)
50 cirrhotics was (1) 45%, (2) 63%, (3) 70%,
75%, (6) 82%, (8) 90%, (10) 96%. Of those
ascites, 75% died during the first yr. The
diate causes of death among 101 patients
were hepatic (coma, hemorrhage of varices,
rs, erosive gastritis, etc.); 33% died of
hepatic causes, such as heart attack, cardiac
fficiency, stroke, kidney disease, agranulo-
sis, etc. Esophageal varices were proved in
of 150 cirrhotic patients (69.3 %); hemor-
of these varices occurred in 51 (34%);
as a result of hemorrhage occurred in 31
%). Coma developed in 49 (32.7%) cases;
patients (82%) had ascites.

ALTERED CLEARANCE OF FREE AMINO ACIDS
FROM PLASMA OF PATIENTS WITH CIRRHOSIS
E LIVER. (E.) Iob, V. (U. Michigan Med.
Ann Arbor), W. W. Coon and M. Sloan. J.
Res. 6(6):233-239, 1966.

feeding of an egg-protein mixture (egg white,
dry skim milk, 50 g; dextrose 125 g; and
lled water to a total vol. of 500 ml) or
infusion of a balanced soln. of essential
acids to well-compensated cirrhotic patients
ollowed by a significant change in the rate
earance of several amino acids (isoleucine,
ne, valine and threonine) from the plasma.
pattern was unchanged after portacaval
. The increased clearance of branched-chain
acids and threonine may be secondary to a
ive or absolute deficiency of these essential
ing blocks of protein in the cirrhotic pa-
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FREE AMINO ACIDS IN LIVER, PLASMA, AND
MUSCLE OF PATIENTS WITH CIRRHOSIS OF
IVER. (E.) Iob, V. (U. Michigan, Ann Arbor),
Coon and M. Sloan. J. Surg. Res. 7(1):41-
967.

mination of free amino acids in liver,
a and muscle was conducted during portacaval
procedure in 10 patients with cirrhosis and
ients with normal liver function undergoing
cystectomy. All patients with cirrhosis had
hypertension. Blood samples were obtained
to anesthesia, while liver biopsy and
e specimens were taken for histologic
nation. A significant reduction in the
of branch-chain amino acids (valine,
ucine, leucine) was found in the muscle

samples of cirrhotic patients as compared to control patients. In addition, conc. of plasma valine were lowered in fasting patients. It is likely that the demand for branched-chain amino acids in cirrhosis results in a secondary depletion muscle amino acid pool as well as protein catabolism and possible muscle wasting. In association with this, an increased uptake of free amino acids from plasma may be in effect stabilizing the amino acid deficiency in the skeletal muscle.

6573 SEVERE RENAL INSUFFICIENCY OF THE ASCITIC CIRRHOTIC. DESCRIPTION, MECHANISM AND TREATMENT OF ITS PRINCIPAL FORMS. (Fr.)(Rev.) Vesin, P. (31 Rue de Moscou, Paris). Schweiz. Med. Wschr. 97(15):477-484, 1967.

6574 THE SURVIVAL TIME OF PATIENTS WITH CIRRHOSIS OF THE LIVER. (Ger.) Brügel, H. (Intern. Med. Clin., Bad Kissingen, Germany). Munchen. Med. Wschr. 109(16):897-901, 1967.

6575 EXPERT JUDGEMENT OF WORKING CAPACITY IN PORTAL LIVER CIRRHOSIS. (Rus.) Suleeva, L. K. Vrach. Delo (4):120-121, 1967.

6576 EFFICIENCY OF SPLENECTOMY AND TISSUE PORTACAVAL ANASTOMOSES IN PATIENTS WITH LIVER CIRRHOSIS. (Rus.) Sokolova, G. M. (Cent. Inst. Postgrad. Med., Moscow). Vrach. Delo (4):24-28, 1967.

6577 ESOPHAGEAL-GASTRIC REGION IN HEPATIC CIRRHOSIS ANATOMIC-CLINICAL STUDY. (Por.) Treiger, M. (State Hosp., Rio De Janeiro, Brazil), L. J. Abrahão, L. C. Peçanha and F. San Juan. Hospital (Rio) 71(3):645-655, 1967.

6578 TEST WITH HYPOGLYCEMIC SULFONYLUREAS IN HEPATIC CIRRHOSIS. (Sp.) Meeroff, M. (Araoz Alfaro Polyclin., Lanus, Argentina) and I. Ruchelsman. Semana Med. 130(11):419-424, 1967.

6579 CONSIDERATIONS OF ESOPHAGOGASTRODUODENAL RADIOLOGICAL CHANGES DETERMINED IN THE COURSE OF ALCOHOLIC CIRRHOSIS OF THE LIVER. (STATISTICS BASED ON THE STUDY OF 410 CASE REPORTS.) (Fr.) Alary, R., B. Savoye, A. Bel and M. Girard. J. Med. Lyon 48(1117):503-515, 1967.

6580 FAMILIAL JUVENILE CIRRHOSIS. (Sp.) Muñoz Monteavaro, C. (Clin. Hosp., Montevideo, Uruguay), M. Pavlotzky, M. Waserstein, L. Falconi, L. Peri and M. Bordoli. Prensa Med. Argent. 53(37):2005-2009, 1966.

6581 POSSIBILITY OF EARLY CHRONAXIMETRIC DETECTION OF LATENT PARKINSONISM AFTER CO POISONING, IN LIVER CIRRHOSIS AND DURING THERAPY WITH NEUROLEPTIC DRUGS. (Ger.) Speckmann, K. (Johanniter Hosp., Bonn, Germany) and H. J. Markwort. Verh. Deutsch. Ges. Inn. Med. 72:629-632, 1967.

6582 TREATMENT OF HEPATIC COMAS IN CIRRHOTICS. (Fr.) Bernier, J. J. Concours Med. 89(15):2905-2915, 1967.

6583 ANTIALDOSTERONE THERAPY IN LIVER CIRRHOSIS WITH ASCITES. (Rus.) Loginov, A. S. (Acad. Med. Sci. USSR, Moscow) and V. M. Berezov. Sovet. Med. 30(2):39-42, 1967.

6584 GLUCURONYLTRANSFERASE ACTIVITY IN CIRRHOTIC LIVER. (It.) Manenti, F. (U. Modena, Italy) and L. Spanio. Clin. (Bolog 25(6):448-450, 1966.

6585 INCREASED AMMONEMIA AFTER MUSCULAR EXERCISE IN SUBJECTS WITH HEPATIC CIRRHOSIS. (It.) Secchi, G. C. (U. Milan, Ita A. Rezzonico, F. Azzolini and N. Gervasini. Ar Ital. Mal. Appar. Dig. 33(2):215-219, 1966.

36 IMPORTANCE AND SIGNIFICANCE OF SERUM
TRANSFERRIN AND IRON LEVELS IN
GNOSTIC TESTS AND IN THE COURSE OF ICTEROGENIC
ER DISEASES. (It.) Dematte', P. (Civil
p., Treviso, Italy). Rass. Clin. Ter. 65(3):
-181, 1966.

ermination of serum Fe (modified Barkan
hod and spectrophotometry) and unsaturated
nsferrin, or Fe-building capacity (Ventura
hod) levels were conducted in 62 patients
h various liver diseases accompanied by
ndice. In 47 of 50 patients with acute viral
atitis, serum Fe reached highest levels at
20 days from the onset of the disease and
n progressively decreased; serum unsaturated
building capacity decreased during the first 2
and reached normal levels by day 50. The
aturated Fe-building capacity/serum Fe
tient varied from 1 in early weeks to 1.9 in
er weeks when cure was imminent and proved
be a good indication of the return of liver
ction. High SGPT levels appeared early
rst 5 days) in these patients; serum bili-
in levels were highest at days 3-14 and then
idly fell to slightly higher than normal
ues. In 3 patients with subacute viral
atitis, high serum Fe levels with low un-
urated Fe-building capacity/serum Fe quotient
ss than unity in some cases) were constantly
erved. In 9 patients with obstructive
ndice, serum Fe levels were generally
reased, while SGPT levels were higher than
mal.

7 BEHAVIOR OF SERUM BILIRUBIN PIGMENTS
IN PATIENTS WITH CIRRHOGENOUS HEPATIC
EASE AND JAUNDICE. (CHEMICAL DETERMINATIONS
CHROMATOGRAPHIC ANALYSIS). (It.) Manenti,
(U. Modena, Italy), G. Solmi and L. Spanio.
erva Gastroent. 12(2):53-56, 1966.

ermination of serum bilirubin levels was
ducted by various methods in 18 decompensated
rhotic patients with jaundice. Serum
irubin levels ranged from 3.38-0.45 mg% with
Weber-Schalm method and from 0.5-3 mg% with
Malloy-Evelyn method. A predominance of the
jugated bilirubin fraction, indicative of the
lestatic nature of the jaundice, was observed
h both methods. Thin-layer chromatography of
conjugated fractions revealed the following
centage in 14 patients: monoglucuronides
-50%), diglucuronides (50-40%), and other
ctions (10%). In 4 cases, a greater per-
tage increase was seen in the monoglucuronides
-55%) as compared to the diglucuronides
-35%), with no change in the percentage of
er fractions. The physiopathological
lications of the above findings are discussed.

8 COMPUTER ANALYSIS OF POSTCHOLECYSTECTOMY
BILIARY TRACT SYMPTOMS. (E.) Bodvall, B. (U. Goteborg, Sweden) and B. Övergaard. Surg. Gynec. Obstet. 124(4): 723-732, 1967.

A series of 1,930 patients with cholecystectomies for gallstone disease (with a 98.4% follow-up) was composed of 2 groups of patients of almost equal size but with varying periods of observation: Group 1: 938 patients, 5-9 yr. period of observation; and Group 2: 992 patients, with a 2-yr. period of observation. Patients with postcholecystectomy biliary distress (39.6%) were divided according to the severity of their symptoms into the following categories: dyspepsia, 10.7%; attacks of mild pain, 23.5%; occasional attacks of severe pain, 3%; and severe postcholecystectomy biliary distress, 2.4%. The follow-up series was analyzed in an electronic computer, the factors possibly influencing frequency of postcholecystectomy distress being studied by analyses of multiple variances. Group 1 patients with a long interval between cholecystectomy and follow-up had a significantly higher frequency of distress than Group 2 patients with a short interval; distress appeared at any time after the operation. Women had a significantly higher frequency of distress than men. A decreasing frequency of distress with advancing age at cholecystectomy was found in both sexes, except in women 40-49 yr. old who had the highest frequency (53.5%) of all age groups. Patients with cholecystolithiasis had a significantly higher frequency of postcholecystectomy distress than patients with mild to moderate cholecystitis and severe cholecystitis. The longer the preoperative history, the higher was the frequency of distress. Sex, age, length of precholecystectomy history and type of gallbladder disease were factors which, independently of each other, influenced the frequency of postcholecystectomy biliary distress. The frequency of postcholecystectomy distress was lower the later in the course of acute cholecystitis that cholecystectomy had been performed. Choledocholithotomized patients had a significantly lower frequency of postcholecystectomy distress than did those patients who had not undergone this procedure. Patients with a functioning gallbladder had a significantly higher frequency of postcholecystectomy distress than did those with a nonfunctioning gallbladder. Size or number of stones in the gallbladder did not influence the frequency of distress. Patients with an acalculous, functioning gallbladder had a significantly higher frequency of postcholecystectomy distress than the group with stones in a functioning gallbladder. Gallbladder disease itself, not the presence of a stone, influenced the frequency of postcholecystectomy biliary distress. Patients with dyspepsia and attacks of mild pain considered themsleves improved by the cholecystectomy; these constituted 34.2% of the entire series. Patients with occasional attacks of severe pain (3%) did not present any major therapeutic problems; the reverse was true of the remaining 2.4% with disabling symptoms of severe postcholecystectomy biliary distress.

6589 FIBROSIS OF THE PAPILLA OF VATER. (E.) Acosta, J. M. (Harvard Med. Sch., Boston, Mass.), F. Civantos, G. L. Nardi and B. Castleman. Surg. Gynec. Obstet. 124(4):787-794, 1967.

Pathologic changes in the papilla of Vater were investigated in an unselected series of 38 patients undergoing sphincterotomy for relief of abdominal pain which was thought to be caused by pancreatitis. Of 38 surgical specimens, 22 showed histological abnormalities consisting of varying degrees of fibrosis, pseudopolyp formation and chronic and acute inflammation. Careful retrospective evaluation of these patients suggested that some did not have pancreatitis, while others had associated biliary obstruction. The latter group usually benefited by sphincterotomy. No attempt was made to evaluate or justify use of sphincterotomy as a therapeutic procedure. From these studies it is concluded that pathologic changes frequently occur in such patients, and these changes may be associated with pancreatic obstruction, biliary obstruction, or both.

6590 THE EFFECTS OF BILE DUCT LIGATION AND INFLAMMATION IN THE FETUS. (E.) Holder, T. M. (U. Kansas Med. Ctr., Kansas City) and K. W. Ashcraft. J. Pediat. Surg. 2(1): 35-40, 1967.

Ligation of the common bile duct and inj. of 5% sodium morrhuate, 2% or 5% NaOH, or 5% formalin, either singly or in combination, was carried out in 30 fetal puppies. Histologic sections of the liver, gallbladder and extrahepatic ducts were prepared using eosin and hematoxylin and Gomori trichrome stains, while bilirubin determinations were done using the same semimicro method employed for pediatric patients. The time interval between surgery and birth was 2-6 days in the group of 8 fetal puppies (5 inj. with sodium morrhuate, 2 with duct ligation and 1 sham control) born alive. Survival time lasted from 1 hr.-7 days. Severe necrosis of both the liver and intestine characterized puppies inj. with NaOH and formalin. Three days after morrhuate inj., there was observed variable necrosis and sloughing of the epithelium of the extrahepatic ducts, edema and necrosis of the walls, and focal periportal necrosis of the liver with acute inflammation, especially around the bile ducts. Thickening and narrowing of the main bile ducts were noted along with narrowing of portal areas and bile duct proliferation at 10 days after morrhuate inj. Occasional bile thrombi were also seen. The histologic picture 10 days after bile duct ligation showed total obstruction at the ligation site with marked dilatation proximally, significant bile duct proliferation, some periportal chronic inflammation, generalized bile duct thrombosis in canaliculi and pronounced extramedullary hematopoiesis. In 4 puppies bilirubin determinations demonstrated that bile duct obstruction at birth is associated with significant jaundice.

6591 7-CHLORO-4-HYDROXY-5-INDANCARBOXYLIC ACID (CHIA): A NEW HYDROCHOLERETIC AGENT. (E.) Marshall, F. N. (Dow Chem. Co., Indianapolis, Ind.) and J. P. Long. Arch. Int Pharmacodyn. 165(2):405-409, 1967.

7-Chloro-4-hydroxy-5-indancarboxylic acid was found to be a potent, long-acting, hydrocholeretic agent in anesthetized and unanesthetized dogs, being effective both when admin. i.v. and p.o. It was less potent than dehydrocholic acid during the first 30 min. after admin., but was more potent than florantyrone when total activity was compared over a perio of 5 hr. The LD_{50} after i.v. admin. in rats was 49.0 mg/kg; after intragastric admin., the LD_{50} was 512.9 mg/kg.

6592 NEW CASE OF "CAROLI'S DISEASE" WITH GIANT BILOBAR SEGMENTAL DILATIONS, COMPLICATED BY LITHIASIS AND CURED BY SURGERY. (Fr.) Farah, M., E. Hélou, W. Nasser and W. Tabbara. Rev. Medicochir. Mal. Foie 41(6): 305-328, 1966.

Congenital dilatation of the intrahepatic bile ducts, without cirrhosis or portal hypertensi (Caroli's disease) was diagnosed in a young m (age 19) with intermittent abdominal pain of yr. duration, angiocholitis and a subicteric syndrome. Cholecystectomy, choledochotomy, a transduodenal sphincterotomy with drainage we performed; the postoperative course was uneven ful but 40 days later massive dilatation and lithiasis of some of the extrahepatic bile du were noted. Nephrospongiosis was also found this time. No esophageal varices were presen Since the involvement was apparently localize to several segments of the liver, the patient underwent left hepatectomy with formation of hepatic-choledochal anastomosis in an isolate jejunal segment. There were no signs of recurrence after 3 mo. The 5 other cases of Caroli's disease are reviewed and diagnostic and therapeutic problems are discussed.

6593 ALLERGIC FACTOR IN HEPATOBILIARY MIGRAINE. (Fr.) Bonnet, G. F. (Hotel Dieu, Paris) and P. Nepveux. Sem. Hop (Paris) 43(5):295-299, 1967.

Of 302 patients (259 women, 43 men) with hepatobiliary migraine, 32 (30.5%) showed oth clinical signs of nonallergic nature. In thi

up the av. age was higher (49, compared to
9) and the frequency of cholecystectomy for
hiasis (26%) and arthritis (19.9%) was higher
n in the other patients (10% and 6.7%, resp.).
histamine-latex reaction was allergic in
y 17 of this group (18.4%). The other 302
ients (69.5%) showed 1 or more allergic
ctions, mostly to various foods (especially
ty foods); the histamine-latex reaction was
itive in 168 of these patients (80%). Other
ergens implicated were choleretic substances
ch as alcohol), certain meats (pork, fish,
llfish), bread and high-cellulose leguminous
etables. Of the entire group, 45 (14.9%) had
ergone cholecystectomy for biliary lithiasis
in 1 patient the gallbladder was congenitally
ent. Cholecystography was normal in 50 of
patients studied; gallbladder emptying was
arded in 60 and accelerated in 9.

4 PATHOLOGICAL SIGNIFICANCE OF BACTERIAL
FLORA AND PARASITIC FAUNA OF THE BILE.
.) Gherman, I. (Gastroenterol. Ctr.,
harest, Rumania) and C. Ageelescu. Rev. Int.
at. 16(7):1293-1297, 1966.

5020 bile specimens examined, 445 (7.5%) were
tive for bacteria, the types being colon
illi in 347 (76.22%), enterococci in 53
.6%), Proteus in 44 (9.6%), Staphylococcus in
.2%) and Streptococcus in 2 (0.4%). Parasites
found in 206 specimens (2.4%); Lamblia
estinalis in 203 (98.5%) and Strongyloides
estinalis in 3 (1.4%). In the patients with
teria-positive bile, the primary disease
olved the gallbladder in 52.7%, the intestine
7.6% (duodenitis, enterocolitis, colitis,
), the stomach in 14.8% (gastritis, ulcers,
), the liver in 13% (hepatitis, cirrhosis,
), and extradigestive sites in 1.8%. Bile
cimens positive for parasites were associated
cholecystitis or biliary dyskinesis (not
elithiasis) in 38.2%, intestinal diseases
above) in 30.8%, stomach diseases in 16.2%,
r diseases in 4.4%, and other diseases
luding neuroses and certain allergic
litions) in 10.3%.

5 INVESTIGATIONS ON BILE DIRECTLY FROM
THE LIVER. (Ger.) Jorns, G.
stadt i. Thur. Hosp., Germany). Deutsch.
erdau. Stoffwechselkr. 26(3):138-147, 1966.

mparison is made between gallbladder bile
the bile obtained through a T-drain, i.e.
liver bile. The determination and
uation of liver damage might be better done
liver than gallbladder bile. The
tituents of liver and gallbladder bile are,
., H_2O 97.5%, 85.9%; total solids 2.52%,
%; bile acids 0.93%, 9.14%; mucin and
ring matter 0.53%, 2.98%; cholesterol 0.06%,
%; fat and fatty acids 0.14%, 0.32%; and
ganic salts 0.84%, 0.65%. The vol. of liver
was as high as 1300 ml in the first 24 hr.,

falling to an av. value between 250 and 400 ml/day, with a specific gravity between 1.002 and 1.010, remaining constant in any individual. Bilirubin in 29 of 36 cases was under 100 mg%; in 12 the bilirubin was less than 50 mg%; 6 had values between 100 and 150 mg%; 1 had a value of 189 mg%. The capacity of bile to form emulsions is a function of the bile acid conc. Protein conc. in 28 cases varied from 0.4-1.4 g%. A BSP test given to 1 patient only showed a 50% excretion of the dye into the liver bile in 45 min. 10 days after operation and 97% on the 46th day after operation before the removal of the T-drain. Samples of bile from 30 individuals showed amylase in 23 and trypsin in 6 (5 of these also had amylase). The microscopic examination of liver bile disclosed 6 of 36 samples with no inclusions; 30 had mucous plaques, epithelial and blood cells; 10 had bacteria.

6596 STUDIES ON BILIRUBIN IN BILIARY TRACT DISEASE. (Jap.) Inoue, T. (Kyushu U., Fukuoka, Japan). Igaku Kenkyu (Acta Medica) 36(4):417-443, 1966.

Studies were made on the nature of bilirubin in bile from both the gallbladder and liver, and changes of bilirubin associated with pathological conditions; material included 13 patients with either gastric or duodenal ulcer, or gastric cancer; 8 patients with cholecystitis without calculi; 34 patients with bilirubin stones in the gallbladder and/or common bile duct; 31 patients with cholesterol stones in the gallbladder and/or common bile duct, and 3 patients with pancreatic cancer. Total bilirubin, the ratio of total bilirubin to total solids and indirect bilirubin were measured by the Evelyn-Malloy and Billing methods. Conjugated bilirubin was converted to the amiline azopigment derivative and then fractionated by quantitative thin-layer chromatography into 3 fractions. One fraction was tentatively identified from its chemical composition as a free azopigment, and another fraction as a glucuronide azopigment. In bile from gallbladder without any pathological condition, the total bilirubin content was 3.62 ± 0.12 mg/ml and the ratio of total bilirubin to total solids was 2.21 ± 0.72%. Indirect bilirubin and bilirubin glucuronide comprised 13.0 ± 11.9% and 70.8 ± 6.2% of total bilirubin, resp. A marked decrease in the total bilirubin content and concomitant increase of indirect bilirubin were observed in the gallbladder bile when calculi were present in the common bile duct, while no such changes were found when calculi were only in the gallbladder. In most biliary tract diseases, the glucuronide conjugate constituted 60-70% of the total bilirubin, and no marked difference was found among the various types of diseases. In hepatic bile, indirect bilirubin occupied 25-35% in most of the cases with biliary tract diseases, the figure being a little higher than that in gallbladder bile. Glucuronide conjugate occupied 40-60% in the hepatic bile, which was somewhat less than that in the gallbladder bile.

6597 GALLBLADDER DYSPLASIAS (SO-CALLED CHOLECYSTOSIS). OBSERVATIONS ON 152 CASES. (It.) Gibertini, G. (U. Modena, Italy), R. Lodi, A. Torricelli and E. Zambarda. Ann. Ital. Chir. 42(9/10):707-745, 1966.

A study is made of clinical and therapeutic aspects of a group of gallbladder dysplasias of a predominantly proliferative or degenerative nature (rather than inflammatory or neoplastic), with or without lithiasis, which the authors classify as hyperplastic cholecystosis. Among 2400 gallbladder operations reviewed, 152 (6.33%) such cases (127 women and 25 men) were observed which included cholesterosis (62), adenomyomatosis (45), papillomatosis (11), calcified gallbladder (4), bilocular and pluriseptal gallbladder (19), diverticula (10), and gallbladder duplication with cholesterosis (1). Although their anatomopathological features differ widely, they may be considered a clinical entity from a pathogenetic (congenital or possibly hormonal) and symptomatological (dyspeptic pain characteristic of prelithiasis or some of the more common gallbladder disturbances) viewpoint. Direct and indirect radiological signs are described and their importance in preoperative diagnosis stressed. Treatment of forms without lithiasis and resistant to medication is generally by cholecystectomy. The problem of malignant transformation (especially of polyps) is discussed.

6598 EXPERIMENTAL STUDIES IN THE KINETICS OF THE PLASMA CLEARANCE OF INDOCYANINE GREEN, A SUBSTANCE USEFUL IN DETERMINING HEPATOBILIARY PARENCHYMAL CLEARANCE. (It.) Massari, N. (U. Milan, Italy), C. Santambrogio, F. Civardi, L. Tenconi, C. Guardamagna, S. Negri and S. Procaccia. Rass. Clin. Ter. 65(3): 143-157, 1966.

The kinetics of the plasma clearance of indocyanine green were studied in 97 male rats (Long Island strain) following inj. into the dorsal vein of the foot of 2.5 mg% soln. of the dye and extraction of blood samples from the femoral vein 2-20 min. after the end of the inj. Following inj. into the blood stream, indocyanine green showed an exponential type of plasma clearance and preference for hepatic uptake analogous to that observed with BSP. Thus, the dye can be used in determining hepatic plasma clearance. The mode of plasma clearance and the factors influencing it are similar to those seen with BSP. A dose of 4 mg/100 g of body wt. of indocyanine green was considered appropriate for hepatic function testing and for the 2 principal components of the plasma clearance curve: hepatic uptake and accumulation and biliary excretion.

6599 PERCUTANEOUS CHOLANGIOGRAPHY AND AORTOGRAPHY BY CATHETER TECHNIC.
(E.) Maxwell, J. W. (VA Hosp., Pittsburgh, P
W. C. Davis and F. C. Jackson. Amer. Surg.
33(3):179-182, 1967.

The methods of percutaneous transhepatic
cholangiography and translumbar aortography b
the flexible hubbed cannula technic are described. Both have proved to be a rapid, saf
and effective method of visualizing the bilia
tract and the abdominal aorta and its major
branches (which distribute to major portions
the gastrointestinal tract), and there have
been no mortalities or serious sequelae resul
ing from these procedures. The biliary tree
was successfully visualized in 18 of 20 patie
using the first technic; the remaining 2 were
found to have intrahepatic cholestasis and
needless surgery was obviated. Cholangiograp
enabled the operative procedure to be simplif
in a patient with a high common duct obstruct
demonstrated preoperatively, and in another
case, an intrahepatic ductal obstruction due
tumor not amenable to surgery was observed.
Both the intercostal and subcostal routes hav
been used with equally good results. Percuta
cholangiography is also valuable in establish
ing the exact site of extrahepatic obstructio
preoperatively in patients whose diagnoses ar
reasonably certain, because it facilitates th
operative procedure by reducing the time of
needless and excessive exploration.

6600 AN EVALUATION OF SILICONE RUBBER TU
ING AS A REPLACEMENT OF THE COMMON
BILE DUCT. (E.) Bradley, B. E. (US Naval Me
Res. Inst., Bethesda, Md.), G. C. Vineyard, A
Defalco, D. Lawson and J. R. Hayes. Amer. J.
Surg. 113(4):501-506, 1967.

Silastic tubing (silicone polymer) was used a
replacement of the common bile duct in 19 dog
4 of which had experimentally produced total
obstruction of the common bile duct. Using t
parameters of intermittent serum alkaline
phosphatase and total bilirubin determinatio
and gross and microscopic hepatobiliary tiss
examination, Silastic tubing was found to
function adequately as a bile conduit in 13
(68%) of 19 animals for periods of up to 12
Clogging of the synthetic duct with precipit
bile salts occurred in 1 animal, while in no
was there disintegration of the synthetic
common bile duct. Synthetic duct extrusion
occurred in 4 dogs, and only slight dilatati
of the proximal biliary tree was observed in
of 12 dogs with patent Silastic ducts that
survived until sacrifice. It is concluded t
silicone rubber may be a useful replacement
material for the common bile duct.

6601 ELECTROPHORETIC AND ENZYME CHANGES
CAUSED BY EXPERIMENTAL CHOLESTASIS.
(It.) Arezio, G. (U. Pavia, Italy), G. M. C

G. Gallinotto. Minerva Chir. 21(14):
636, 1966.

rmination of serum protein (electrophoresis)
enzyme levels (transaminase by the Karmen
od; lactic and malic dehydrogenase by the
-Gehm method) was conducted in 16 male
its in which cholestasis was provoked by
ture of the extrahepatic biliary duct. At
10 following surgery, no changes were
rved in serum enzyme levels or in serum
ein fractions. Serum transaminase levels
perceptibly decreased by day 20 and con-
ed to decrease markedly afterwards; by day
dehydrogenase levels were also below normal
to a lesser degree than transaminase levels.
ay 20, progressive decrease of serum albumin
g with an increase in gamma- and beta-
ulins (especially the latter) were observed.
l serum protein levels were not significantly
red. It is concluded that hepatic cells
relatively resistant to bile stasis and that
tic cell injury is the result of other
ors (such as infection or metabolic and
trolyte imbalance) as well. It is also
luded that the changes observed above in
m protein and enzyme levels do not represent
nsitive index of hepatic cell injury.

THE TOLBUTAMIDE TEST IN THE DIAGNOSIS
OF OBSTRUCTIVE JAUNDICE. (It.)
pelli, A. (Riuniti Hosp., Verbania, Italy).
d. Ital. Chir. 15(2):117-123, 1966.

d glucose levels after tolbutamide admin.
i.v. over a 3-min. period) were studied in
ormal subjects (6 men and 4 women; age
) yr.), in 7 patients (6 women and 1 man;
32-63 yr.) with obstructive jaundice caused
allstones, and in 5 patients (3 men and 2
n; age 52-72 yr.) with obstructive jaundice
to pancreatic cancer. In normal controls
blood glucose decrease (49.9%) occurred 40
after inj., with a decrease of 34.9%
rved after 60 min. The decrease in blood
ose levels after 20, 30, 40, and 60 min. was
25.2, 37.3, and 30.5%, resp., in patients
gallstones and 12.2, 21.3, 25.2, and 25.2%,
, among patients with cancer. Results
cate less of a decrease in blood glucose
ls in patients with gallstones as compared
ontrols, and a still lower decrease in
er patients as compared to those with gall-
es as a result of tolbutamide admin. The
ible value of tolbutamide as a test for the
erential diagnosis of the two types of
dice is discussed.

RADIOLOGICAL OBSERVATIONS ON ALTERATIONS
OF THE BILIARY SYSTEM SECONDARY TO
KED BILE FLOW: HYDROHEPATOSIS. (It.)
remoli, A. (U. Bologna, Italy). Radiol. Med.
no) 52(6):513-548, 1966.

ts of retrograde cholangiography are
rted in 22 surgical patients (18 women and
4 men; age 28-76 years) with biliary tract disease caused by progressive blockage of bile flow. Morphological alterations consisted of dilatation and curvature of the hepatic and common bile ducts; formation of a "pseudopelvis", i.e. a dilated area of confluence between the superior bile and hepatic ducts with reduced bifurcation angle; marked dilatation of the zonal intrahepatic ducts; dilatation and "pseudomultiplication" of the secondary intrahepatic ducts. In 5 patients a true picture of blocked bile flow, or hydrohepatosis, was observed. These patients showed very marked and irreversible dilatation of the common bile duct, with little or no curvature, as well as reduced transit of contrast medium and other signs described above to a more marked degree. The pathogenetic mechanism of this condition seems to be similar to that of hydronephrosis, and various interpretations are examined.

6604 THE SPONTANEOUS DISAPPEARANCE OF GALLSTONES. (E.) Arcomano, J. P. (22 High St., Huntington, N. Y.), H. N. Schwinger and J. DeAngelis. Amer. J. Roentgen. 99(3):637-641, 1967.

6605 THE IMPAIRMENT OF SOME FUNCTIONS OF THE LIVER IN ACUTE CHOLECYSTITIS. (Rus.) Struchkov, V. I. (1st Sechenov Order of Lenin Hosp., Moscow), V. S. Vasil'ev and M. P. Rubin. Vestn. Khir. Grekov. 98(1):36-41, 1967.

6606 INTERNAL BILIARY FISTULAS AS A COMPLICATION OF ACUTE CHOLECYSTITIS. (Rus.) Borovyi, E. M. (Rovenki Reg. Hosp., USSR). Sovet. Med. 30(2):97-99, 1967.

6607 CHOLECYSTITIS IN MEN. (Rus.) Korolev, B. A. (Gorki Kirov Med. Inst., USSR) and D. L. Pikovskii. Sovet. Med. 30(2):100-102, 1967.

6608 CAUSES OF DEATH IN ACUTE CHOLECYSTITIS. (Rus.) Biriukova, V. V. (Leningrad Kirov Inst. Postgrad. Med., USSR). Klin. Khir. (Kiev) (3):22-25, 1967.

6609 ACUTE SUPPURATIVE CHOLANGITIS. EXPERIENCE WITH 15 CONSECUTIVE CASES. (E.) Haupert, A. P. (Marquette U. Sch. Med., Milwaukee, Wisc.), L. C. Carey, W. E. Evans and E. H. Ellison. Arch. Surg. (Chicago) 94(4): 460-468, 1967.

6610 ACUTE PAPILLO-ODDITIS AS A CAUSE OF MECHANICAL JAUNDICE. (Bul.) Khaitova, A. and P. Pomakov. Vatr. Bolesti 5(1):120-126, 1966.

6611 TORSION OF THE GALLBLADDER. (E.) Rietberg, M. (State U., Groningen, Netherlands). Arch. Chir. Neerl. 18(3):195-201, 1966.

6612 CHOLELITHIASIS IN CHILDHOOD. (It.) Casagrande, A. (C. Cantu Hosp., Abbiategrasso, Italy) and A. Fiocchi. Gazz. Sanit. (Milano) 37(7-8):357-360, 1966.

6613 HEMOBILIA. (Pol.) Karwowski, A. (2nd Surg. Clin., Warsaw) and I. Suszczewska-Fischerowa. Pol. Przegl. Chir. 39(3):230-233, 1967.

6614 ABILITY OF A NEW LONG-ACTING SULFONAMIDE FANASIL TO PASS THRU THE BILE AFTER ORAL APPLICATION. (Ger.) Stauber, R. (Leoben Hosp., Austria). Wien. Klin. Wschr. 79(15):269-273, 1967.

6615 ROENTGENOLOGICAL EXPLORATION OF THE BILIARY TRACT PRIOR TO AND DURING THE OPERATION. (Rus.) Gadzhiev, A. S. (Kalinin Med. Inst., USSR) and M. N. Teben'kov. Sovet. Med. 30(2):94-97, 1967.

6616 LAPAROSCOPIC CHOLANGIOGRAPHY. (Rus.) Vinogradov, V. V. (Lumumba Friendship U., Moscow), V. I. Kochiashvili and F. A. Bragin. Klin. Khir. (Kiev) (3):25-28, 1967.

6617 DIFFICULTIES AND ERRORS IN DIAGNOSIS OF THE SYNDROME OF ELONGATED STUMP OF THE CYSTIC DUCT AFTER CHOLECYSTECTOMY. (Pol.) Dobrowolski, J. (1st Surg. Clin., Zabrze, Poland), M. Glinski and E. Szlachta. Pol. Przegl. Chir. 39(3):239-243, 1967.

6618 INTRAOPERATIVE CHOLANGIOGRAPHY. (Ger.) Plettner, U. (Region. Hosp., Dessau, Germany). Zbl. Chir. 92(12):448-450, 1967.

6619 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (E.) Mulero, H. L. (Wayne State U., Dearborn, Mich.) and H. P. Carvalho. Amer. J. Gastroent. 47(2):113-123, 1967.

6620 THE ANATOMICAL DIAGNOSIS OF JAUNDICE BY PERCUTANEOUS CHOLANGIOGRAPHY AND ITS INFLUENCE ON TREATMENT. (E.) Thorbjarnarson, B. (New York Hosp.-Cornell Med. Ctr., N. Y.). Surgery 61(3):347-354, 1967.

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6622 FREQUENCY OF CHOLECYSTOSIS IN SUBJECTS SUBMITTED TO RADIOLOGICAL INVESTIGATION OF THE GALLBLADDER. (It.) Cosmacini, G. (Milan Gen. Hosp., Italy) and F
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6623 ETIOLOGY AND TREATMENT OF RECURRENC
AFTER BILE DUCT SURGERY. (Rus.) Kurbangaleev, S. M. (1st Pavlov Leningrad Med
Inst., USSR) and M. B. Rall. Vestn. Khir. Grekov. 98(2):20-24, 1967.

6624 INDICATIONS FOR SURGERY AND PROGNOS
IN BILIARY ILEUS. (Ger.) Enderlin
F. (U. Clin. Basel, Switzerland) and A. Nadja
Praxis 56(16):541-546, 1967.

6625 LATE RESULTS OF CHOLEDOCHAL SURGERY
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6626 POSTOPERATIVE HERNIAS AFTER SURGERY
FOR ACUTE CHOLECYSTITIS. (Rus.) Karnov, M. M. (Leningrad Dzhanelidze Res. Ins
Emergency Treatment, USSR). Vestn. Khir. Gre
98(3):24-26, 1967.

6627 USE OF TRANSHEPATIC INTUBATION IN BILIARY STRICTURE REPAIR. (E.) Burrows, L. (Mount Sinai Hosp., New York, N.
and A. E. Kark. Amer. J. Surg. 113(3):409-4
1967.

6628 HEPATIC LESION IN EXTRAHEPATIC BILIARY TRACT DISEASES. (Fr.) Verme, G. (U. Sienne, France) and M. Gentili
Rev. Int. Hepat. 17(1):15-33, 1967.

6629 INJURIES TO BILIARY TRACTS OCCURRI
DURING OPERATIVE PROCEDURES ON THE
(Pol.) Spruch, T. (1st Surg. Clin., Lublin, Poland) and L. Kurylcio. Pol. Przegl. Chir. 39(3):216-218, 1967.

6630 SURGICAL MANAGEMENT OF CHOLEDOCHOLITHIASIS. (E.) Stefanini, P. (U. Rome). J. Abdom. Surg. 9(5):142-146, 19

6631 EARLY OPERATIVE TREATMENT OF ACUTE
CHOLECYSTITIS. (Pol.) Berner, J.
(3rd Surg. Clin., Lodz, Poland) and A. Sołty
Wiad. Lek. 20(5):429-431, 1967.

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GASTROENTEROLOGY
ABSTRACTS
AND
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NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

U.S. DEPARTMENT OF
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology had accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus. For journals not covered by Index Medicus, the abbreviations (with some modifications) found in World Medical Periodicals, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Gr.	Greek	Pol.	Polish
Ar.	Arabic	Heb.	Hebrew	Por.	Portuguese
Bul.	Bulgarian	Hun.	Hungarian	Rum.	Rumanian
Ch.	Chinese	Ic.	Icelandic	Rus.	Russian
Cz.	Czech	In.	Indonesian	Ser.	Serbo-Croatian
Dan.	Danish	It.	Italian	Sl.	Slovene
Dut.	Dutch	Jap.	Japanese	Sp.	Spanish
E.	English	Kor.	Korean	Sw.	Swedish
Eston.	Estonian	Latv.	Latvian	Th.	Thai
Fin.	Finnish	Lith.	Lithuanian	Turk.	Turkish
Fr.	French	Maced.	Macedonian	Uk.	Ukrainian
Ger.	German	Nor.	Norwegian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adenocorticotropic hormone	µM	micromolar
admin.	administered, administration	max.	maximum, maximal
ADP	adenosine diphosphate	mc,µc	milli-, microcurie(s)
ATP	adenosine triphosphate	mg	milligram(s)
approx.	approximately	min.	minute(s)
av.	average(d)	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
°C	degrees centigrade	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
CNS	central nervous system	ng	nanogram (10-9)
conc.	concentrate(d), concentration(s)	pg	picogram (10-12)
		p.o.	orally
cpm	counts per minute	ppm	parts per million
DNA	deoxyribonucleic acid	r	Roentgen
e.g.	for example	RBC	red blood cells (erythrocytes)
g	gram(s)	resp.	respectively
µg	microgram(s)	Rev.	review (only in cite)
hr.	hour(s)	RNA	ribonucleic acid
i.m.	intramuscular	s.c.	subcutaneous
inj.	injected, injection(s)	sec.	second(s)
i.p.	intraperitoneal	SGOT	serum glutamic-oxalacetic transaminase
I.U.	international unit(s)	SGPT	serum glutamic-pyruvic transaminase
i.v.	intravenous	soln.	solution(s)
kg	kilogram(s)	U	unit(s)
LD_{50}	median lethal dose(s)	UV	ultraviolet
LDH	lactic acid dehydrogenase	vol.	volume
m	meter(s)	WBC	white blood cells (leukocytes) or count
M	molar		
mEq	milliequivalent(s)	wk.	week(s)
mM	millimolar	wt.	weight(s)

yr. year(s)

PRE-CLINICAL SCIENCES

GENERAL

632 ULTRAVIOLET-INDUCED COLICINES OF
Escherichia coli FROM THE NORMAL HUMAN
NTESTINE. (E.) Young, V. M. (NIH, Bethesda,
d.), W. C. Branche, Jr., D. M. Kenton and M. R.
ee. *J. Path. Bact.* 92(2):303-311, 1966.

trains of *Escherichia coli*, obtained from fecal
ultures taken monthly for 6 mo. from 5 persons,
ere exposed to UV radiation to induce production
f colicines. Of 259 strains recovered, 75
ielded colicines, whereas 159 of these had pre-
iously been observed to produce colicines without
nduction. Of colicines induced from *E. coli*
trains obtained from 3 people with the least
table flora of *E. coli*, 13.9% of the colicines
ere active against the parent *E. coli*. Induced
olicines were active against 15% of 234 randomly
elected indicator strains of *E. coli*. One indica-
or strain was sensitive to 69.3% of induced
olicines, a sensitivity similar to that of the
nown indicator *E. coli*. Colicinogen activity
ften varied in irradiated broth cultures in-
ubated for 3.5 and 24 hr. at 37°C. Colicine
roduction was not constant in organisms of the
ame serotype isolated from the same individual
t different times. Although colicinogeny appears
o be associated with the ability of some strains
f *E. coli* to maintain themselves as dominant
esidents in the human intestine, the role of
nduced colicines in the ecology of intestinal
lora remains undetermined.

633 EXTRAVASCULAR SHORT-CIRCUITING OF OXYGEN
INDICATING COUNTERCURRENT EXCHANGE IN
HE INTESTINAL VILLI OF THE CAT. (E.) Kampp, M.
U. Goteborg, Sweden), O. Lundgren and N. J.
ilsson. *Experientia* 23(3):197-198, 1967.

ifferent blood mixtures including oxygenated
lood, blood containing methemoglobinemic cells,
nd a mixture of the 2 preparations were inj.
nto the superior mesenteric artery of the cat
ollowed by measurement of time of appearance
f O_2 in venous blood. Oximeter tracings were
btained from the venous outflow of denervated
ejunal segments. Results demonstrated that O_2
ppears approx. 1-2 sec. before methemoglobinemic
ells. Increased O_2 saturation of hemoglobin was
ndicated by an initial upward deflection approx.
.5 sec. after inj. which was followed by a down-
ard deflection at 4 sec. after inj. indicating
he appearance of methemoglobinemic cells in the
enous blood. Venous outflow measured concurrently
ith both inj. was 41 ml/min. per 100 g of tissue.
mixed preparation resulted in an initial upward
eflection after approx. 2.5 sec. followed
mmediately by a downward deflection having a
lightly greater magnitude. The longer appearance
ime of methemoglobin RBC compared to oxygenated
BC suggests that O_2 may diffuse and short circuit
xtravascularly in the intestinal villus, probably
etween the ascending and descending limbs of the
ascular loop.

6634 AGE AND THE CELL CYCLE OF THE MOUSE COLONIC EPITHELIUM. (E.) Thrasher, J. D. *Anat. Rec.* 157(4):621-626, 1967.

6635 CELL PROLIFERATION STUDIES IN THE INTESTINAL EPITHELIUM OF THE RAT. HYPERPLASIA DURING LACTATION. (E.) Cairnie, A. B. (Inst. Cancer Res., Sutton, Surrey, England) and R. E. Bentley. *Exp. Cell Res.* 46(2):428-440, 1967.

6636 RELATIVE CHANGE IN GASTROINTESTINAL WEIGHT DURING LACTATION. (E.) Spencer, R. P. (Yale U. Sch. Med., New Haven, Conn.). *Amer. J. Dig. Dis.* 12(5):527-528, 1967.

6637 EFFECTS OF EPINEPHRINE AND NOREPINEPHRINE ON THE MESENTERIC CIRCULATION OF THE CAT. (E.) Ross, G. (U. California, Los Angeles). *Amer. J. Physiol.* 212(5):1037-1042, 1967.

6638 INFLUENCE OF A MIXTURE OF CHEMICAL RADIOPROTECTORS ON THE CELLULAR RENEWAL IN THE DUODENUM OF MICE. (E.) Maisin, J. R. (Nucl. Energ. Stud. Ctr., Mol, Belgium) and M. Lambiet. *Nature (London)* 214(5086):412-413, 1967.

6639 THE SEPARATION OF THE α-GLYCEROPHOSPHATE AND MONOGLYCERIDE PATHWAYS IN THE INTESTINAL BIOSYNTHESIS OF TRIGLYCERIDES. (E.) Johnston, J. M. (U. Texas, Dallas), G. A. Rao and P. A. Lowe. *Biochim. Biophys. Acta* 137(3): 578-580, 1967.

6640 INTERNAL PRESSURES OF SMALL ARTERIES AND LYMPH VESSELS OF THE EXPOSED RABBIT MESENTERY WITH A PRACTICAL METHOD FOR MEASUREMENT. (E.) Mori, K. (Nagoya City U. Med. Sch., Japan), M. Takada, F. Kato, K. Torizawa, I. Chaya and K. Hotta. *Nagoya Med. J.* 12(4):261-264, 1966.

6641 BEHAVIOR AND METABOLIC SIGNIFICANCE OF PLASMA FREE FATTY ACIDS AFTER TOTAL PANCREATECTOMY. (It.) Siri L. D., G. (U. Pavia, Italy). *Chir. Ital.* 17(6):685-693, 1965.

6642 ELECTRON MICROSCOPIC ALTERATIONS OF SUBMAXILLARY GLAND PRODUCED BY ISOPROTERENOL. (E.) Takahama, M. (Mt. Sinai Hosp., New York, N. Y.) and T. Barka. *J. Ultrastruct. Res.* 17(5-6):452-474, 1967.

6643 HISTOCHEMICAL REACTIONS OF THE ENTEROCHROMAFFIN CELLS AND THE 5-HYDROXYTRYPTAMINE CONTENT OF THE MAMMALIAN DUODENUM. (E.) Penttilä, A. (U. Helsinki). Acta Physiol. Scand. 69(Suppl. 281):7-77, 1966.

Formaldehyde-induced fluorescence and 5 staining reactions were studied in the duodenal enterochromaffin cells of the sheep, cow, pig, guinea pig, mouse, rat and rabbit. The former was the most specific and sensitive, the argyrophil method the most effective of the stains. All fluorescent enterochromaffin cells were also argyrophil. Argentaffin reaction stained all the enterochromaffin cells in the sheep, cow, pig and guinea pig, but only some in the other species. Only in pig and guinea pig were ferric ferricyanide, diazo coupling and indophenol positive in all fluorescent enterochromaffin cells, but were indophenol-negative in the other animals. The number of fluorescent enterochromaffin cells/mm^3 duodenal tissue and the serotonin conc. (µg/g duodenal tissue) were determined from adjacent duodenal specimens taken near the pylorus of the 8 adult species and from developing duodenum of guinea pig and rat. Enterochromaffin cells were numerous in the guinea pig and sheep, few in the horse, moderate in the others; serotonin conc. followed the same pattern. The correlation between enterochromaffin cell number and serotonin conc. was highly significant. In developing guinea pig, levels were similar to the adult; in developing rat, levels were lower than adult (reached in 24-32 days). In the guinea pig, reserpine had no effect on argyrophil, abolished the diazo coupling and indophenol reaction more effectively than argentaffin and ferric ferricyanide, had a weak effect on fluorescence. Enterochromaffin cell number and serotonin conc. varied together. In the adult rat, reserpine caused no histological changes in enterochromaffin cells, but in the newborn rats weakened the fluorescence. The largest doses reduced the serotonin conc. significantly, without causing any alterations in the enterochromaffin cell number of adult or newborn rats. Chronic cortisone treatment increased both parameters in the newborn rat, but fluorescence was unaffected. It is concluded that in the above mammal species the enterochromaffin system is morphologically and functionally similar and that there is only 1 principal type of enterochromaffin cell in adult mammals.

6644 HISTOCHEMICAL STUDY OF PANETH CELL GRANULES IN MICE. (It.) Riva, A. (U. Cagliari, Italy). Arch. Ital. Anat. Embriol. 71(3):191-203, 1966.

In the jejunum of newborn to 8-mo.-old, male, albino Swiss mice, zymogenic granules found in Paneth cells showed an enveloping structure which had all the characteristics of a sialomucin, rather than a perigranular halo. The structure was digested by trypsin, although the central portion, which it enveloped, was not. From the time of their first appearance, 11-12 days after birth, these granules consisted of a central, periodic acid Schiff-positive portion, apparently lacking acidity, plus the sialoprotein, periphera "envelope" described, with essentially identical histochemical characteristics irrespective of the age of the animal from which they were derived.

6645 THE ORIGIN, DEVELOPMENT AND DIFFERENTIA TION OF BRUNNER'S GLANDS IN THE RAT. (E.) Krause, W. J. (U. Iowa, Iowa City) and C. R. Leeson. J. Anat. 101(2):309-320, 1966.

Studies on 270 prenatal (1 group of 8/day of 16-21-day-old embryos) and postnatal (daily from birth-10 days; weekly from 2-9 wk.; 1 group each, 24 and 33 wk.) Long-Evans rats are reported. Longitudinal ridges appear in the stratified epithelium of the duodenum of 17-day embryos, a time when epithelium is in a stage of cell proliferation. At this time vacuolization appears in epithelium of pylorus and duodenum and is followed by evagination of connective tissue (lamina propria). Duodenum of the 18-day embryo shows invagination of epithelium to initiate formation of Brunner's glands and crypts of Lieberkühn. At this time goblet cells and villi appear and in the lamina propria myoblasts differentiate to form a primitive muscula mucosa, most marked in relation to pyloric mucos Brunner's glands arise primarily from bases of crypts from the 19-day embryo until the end of the second postnatal mo. Glands begin as buds which proliferate downward and branch to give rise to tubules and to a duct system. The gland are less well developed on the side associated with the pancreas, probably due to vascular deficiency. The secretory product of component cells (periodic acid Schiff-positive and resistant to saliva or animal diastase digestion) accumulates in the region of the Golgi apparatus and is then released to the apical portion of the cell where it accumulates. That the secretory process may be apocrine is suggested by the irregular disrupted appearance of the apical border of cells when the secretory produc is expelled. It is suggested that Brunner's glands in the rat be thought of as modified extensions of the crypts of Lieberkühn.

6646 ARTERIAL VASCULARIZATION OF THE ESOPHAGEAL-GASTRIC JUNCTION AND ITS IMPLICATIONS WITH RESPECT TO FUNCTION. (Por.) Ferraz de Carvalho, C. A. (U. Sao Paulo Fac. Med., Brazil). Rev. Hosp. Clin. Fac. Med. S. Paulo 21(3):113-128, 1966.

Arterial vascularization of the esophageal-gastr junction was studied in 92 human preparations, of which 52 were from subjects aged 12-90 yr. and 40 from newborn infants. Arteries rising from the gastric subserosa penetrated the muscle sheath in the zone of esophageal-gastric epithelial transition to reach the submucosa, forming an arterial net which appeared to be essentially independent of either the gastric or the esophageal arterial circulations. Each of these penetrating rteries also appeared to vascularize an esentially independent territory. The particular disposition observed suggested that the muscle heath, in turn, may act as a regulatory mechanism, ontrolling arterial blood flow in this area. pprox. 2 cm distal to the area, the arteries howed a system of very delicate anastomoses with he rest of the gastric submucosal arterial net nd a similar anastomotic system was demonstrable n the abdominal portion of the esophagus, above he transitional area. It is concluded that the ascular pattern of the esophageal-gastric transiion zone, especially in the gastric segment, s similar to that of the lesser curvature of the tomach where the arterial supply is also mainained by arteries rising from the subserosa and enetrating the muscle sheath. It is also sugested that these penetrating arteries of sophageal-gastric junction may act as one of the echanisms involved in avoiding gastroesophageal eflux, by inducing turgescence and spontaneous nfolding of the mucosa.

647 A NOTE ON THE "DARK" CELLS OF THE EXOCRINE PANCREAS. (E.) Ichikawa, A. Tohoku U. Sch. Med., Sendai, Japan). Nippon oshikigaku Kiroku (Arch. Histol. Jap.) 28(1): 7-88, 1967.

ariations in the fine structure of the exocrine ancreatic cells from the guinea pig were corelated with different fixative technics including mmersion (phosphate-buffered osmium tetroxide-, -collidine-buffered osmium tetroxide made sotonic with sucrose and cacodylate-buffered lutaraldehyde soln.), dripping (phosphate-uffered osmium tetroxide) and inj. (Millonig's oln.). Pancreatic specimens from the mouse ere fixed by immersion only. Dark cells were enerally limited to the innermost sector after mmersion fixation using glutaraldehyde soln. ut became generally scattered after osmium etroxide fixation. Dark cells were more prevlent in phosphate buffered than collidine-uffered preparations as well as in the guinea ig preparations generally. Fixation by ripping resulted in "light" cells limited to he superficial and "dark" cells confined to he deeper sectors. Inj. fixation produced light" cells spreading from inj. point, while dark" cells were observed outside this area. ark cells showed no fine structural differences rom "light" cells and are probably related to he severe dehydration of the cytoplasm resulting rom fixation. In addition to the "dark" cell tself, both "central condensation" of zymogen ranule and unhomogeneous agglomeration of the uminar contents are considered artifacts reulting from sample preparation.

6648 A METHOD FOR THE CYTOLOGIC STUDY OF THE INTESTINAL MUCOSA IN SPECIMENS OF ISOLATED EPITHELIUM. (It.) Malacarne, P. (U. Ferrara, Italy) and G. L. Castoldi. Arch. Ital. Mal. Appar. Dig. 33(1):27-36, 1966.

Following conventional washing and shaking in physiologic saline soln., fragments of rat intestine approx. 1 cm long were transferred to a combination of 10 ml isotonic saline plus 0.1 ml glacial acetic acid and agitated for approx. 1 min., resulting in complete separation of the mucosa from the epithelium proper. Following approx. 5 min. exposure to a fresh environment of acid soln., as above, violent agitation was continued until a dense, macroscopically visible suspension of epithelial fragments was obtained, following separation of the villous from the intermediate epithelium. Repetition of the procedure made it possible to eliminate all remaining scraps of supportive tissue, recognizable by their whitish color, and to collect the villous epithelial fragments by centrifugation, resuspending them in physiologic saline. Careful histologic examination confirmed that only the connective structure composed of villi remained, with its normal epithelial coating entirely intact and showing no evidence of either anatomical or structural changes attributable to the procedure. It was possible to demonstrate all cellular elements perfectly, as a whole or individually, permitting highly accurate cytomorphologic, histochemical and quantitative studies to be made.

6649 LYMPHATIC AND BLOOD VESSELS OF THE HUMAN PARIETAL PERITONEUM AND ITS CONSTRUCTION. (Ger.) Juldaschew, I. J. (1st Moscow Med. Inst.). Anat. Anz. 120(2):127-142, 1967.

In injected specimens of human peritoneum, the upper network of lymph capillaries was found underneath the mesothelium and in the upper portion of the collagen network of the peritoneum. The deeper capillary network and the larger lymphatic channels were found in the deeper collagen elastic layer. The fibers of the upper collagen layer were approx. parallel to the orientation of the upper lymphatic capillaries. The plexi of the lymphatic vessels lay in the subserosal fatty layers. Blood capillaries and plexi were seen at various depths in the peritoneal tissues and the subserosal fatty layer. The structure of the lymph node and blood capillaries depended on the functional status of the peritoneum, which varied from 1 place to another and also changed with age. Small mesothelial cells and large lymph capillaries seemed to be combined in areas of intensive absorptive capacity. The close association of lymph and blood capillaries raises doubts of the existence and functional significance of the so-called serous hemolymphatic barrier.

6650 VARIATION OF THE ARTERIES SUPPLYING THE LIVER IN MAN. (E.) Nowak, M. (Dept. Norm. Anat., Acad. Med., Warsaw). *Folia Morph.* (*Warsz.*) 25(3):263-270, 1966.

6651 VARIATIONS OF THE LEFT TRIANGULAR LIGAMENT OF THE LIVER WITH RESPECT TO MORPHOLOGIC TYPE. (Fr.) Outrequin, G., M. Caix and G. Casanova. *C. R. Ass. Anat.* 51(136):756-762, 1967.

6652 NEONATAL LIVER. NOTES ON CYTOLOGY. (HEPATOCYTES: DETAILS OF INFRASTRUCTURE) (Fr.) Turchini, J. P. (Fac. Med., Clermont-Ferrand, France), R. Pourhadi and P. Malet. *C. R. Ass. Anat.* 51(136):1009-1013, 1967.

6653 ULTRASTRUCTURAL ASPECTS OF THE RIBONUCLEOPROTEIN NETWORK IN NUCLEI OF WALKER TUMOR AND RAT LIVER. (E.) Shankar Narayan, K. (Baylor U. Coll. Med., Houston, Texas), W. J. Steele, K. Smetana and H. Busch. *Exp. Cell Res.* 46(1):65-77, 1967.

6654 HEXAGONAL ARRAY OF SUBUNITS IN INTERCELLULAR JUNCTIONS OF THE MOUSE HEART AND LIVER. (E.) Revel, J. P. (Harvard Med. Sch., Boston, Mass.) and M. J. Karnovsky. *J. Cell Biol.* 33(3):C7-C12, 1967.

6655 ELECTRON MICROSCOPIC OBSERVATIONS ON THE INNERVATION OF THE SMOOTH MUSCLE. (E.) Nagasawa, J. (Tohoku U. Sch. Med., Sendai, Japan) and S. Mito. *Tohoku J. Exp. Med.* 91(3):277-293, 1967.

6656 ELECTRON MICROSCOPIC STUDY ON THE CELLULAR INTERRELATIONSHIPS IN THE SMOOTH MUSCLE. (E.) Nagasawa, J. (Tohoku U. Sch. Med, Sendai, Japan) and T. Suzuki. *Tohoku J* *Exp. Med.* 91(3):299-313, 1967.

6657 THE ULTRASTRUCTURE OF CRYSTAL-CONTAINI
CELLS IN THE COLONIC EPITHELIUM OF MICI
(E.) Silva, D. G. (Monash U., Victoria, Austral
J. Ultrastruct. Res. 18(1-2):127-141, 1967.

6658 HISTOLOGICAL AND HISTOCHEMICAL INVESTI
TIONS ON STOMACHS IN MAN, JAPANESE
MONKEY (*Macaca fuscata yakui*) AND SOME OTHER KIN
OF ANIMALS. REPORT 1. CELL DIVISIONS IN THE GASTRIC GLANDS IN MAN, JAPANESE MONKEY AND DOG. (E.) Imai, M. (Aichi-Gakuin U., Nagoya, Japan), T. Shibata and T. Mineda. *Okajima. Folia Anat. Jap.* 43(2):73-85, 1967.

See also abstract nos.: 6720,6773,7364,7374,7380

6659 IRON ABSORPTION AND EXOCRINE PANCREAS FUNCTION. (Ger.) Dietze, F. (Charity Clin., U. Berlin, Germany), G. Brüschke, E. Lindenau, A. Rückert and I. Stockov. Deutsch. Gesundh. 22(7):289-292,.1967.

In normal subjects, p.o. admin. of a pancreas extract containing protease, amylase and lipase (Mezym forte, 18 + 11 + 2 U/tablet, resp.) significantly inhibited the absorption of exogenous Fe. Release of the inhibitory substance was prevented by coating the tablet with an acid-proof substance; the inhibitory principle began to exert its effect after about 1 hr. in the stomach, as shown by the greater inhibitory curve obtained after crushing the tablets. Heating the pancreatic extract (10 min. at over 100°C in aqueous soln.) reduced or neutralized its inhibitory activity; the extent of inhibition of Fe absorption could not be increased by increasing the dosage of the extract. The significance of pancreatic factors in Fe absorption is discussed, with particular reference to the possible etiology of hemochromatosis (possibly a genetic anomaly of pancreatic function, the normal factor(s) inhibiting Fe absorption being absent).

6660 EXPERIMENTAL STUDIES ON IRON ABSORPTION. (Ger.) Kuss, B. (U. Bonn, Germany). Aerztl. Forsch. 20(2):60-71, 1966.

The absorption of Fe was studied in preliminary trials by (1) i.p. inj. of 3.4 mg of Fe as $FeCl_2$ in 5 ml of physiological saline in the guinea pig which has a normal serum level of about 350 μg%; (2) the enteral inj. of the same dose as in (1). Serum levels of Fe increased n both i.p. and enteral inj. more rapidly from the peritoneal cavity (to 619 μg% in 2 min. and to 775 μg% in 3 min.) than from the intestine (391 μg% in 10 min. and 422 μg% in 20 min.). The absorption of Fe through the small intestinal wall was tested in segments of the small ntestine 3-4 cm long, everted, and with both ends tied off; Fe was placed in the medium surrounding the segment. After an interval the fluid content of the segment was removed and the Fe conc. determined. All parameters were kept as constant as possible. The uptake of ferrous and ferric iron was measured by spectrophotometer n jejunal segments of the guinea pig at pH 6, 6.8, 7.2 and 7.8 after different intervals of ime. The most rapid absorption of ferrous iron occurred at pH 7.2, the rate decreasing sharply at higher and lower pH. The absorption of ferric iron was somewhat more rapid than that of ferrous iron; the rate changes in response to pH were similar to those for the divalent ion. he rate of absorption in relation to Fe conc. n the medium resulted in a curve closely esembling the oxygenation curve of hemoglobin; t an Fe conc. of 50 μg the absorption was 95% of max. and at 100 μg about 98% of max. Absorption as influenced by different types of buffer pairs and by temperature was also studied as well as the effect of dinitrophenol. Active transport of ferrous iron in the jejunum of the golden hamster is reported.

6661 IRON ABSORPTION AND RETENTION IN MAN. (E.) Boender, C. A. (State U., Utrecht, Netherlands), E. Mulder, J. E. Ploem, J. De Wael and M. C. Verloop. Nature (London) 213(5082):1236-1237, 1967.

A test dose of 15 μc ^{131}Br and 170 mg $BaSO_4$, 5 μc ^{59}Fe and 1 mg Fe in the form of $FeSO_4$, 10 mg ascorbic acid and 2 g carmine red was admin. to 3 normal subjects with normal hemograms, normal serum Fe conc. and serum Fe saturation percentages; 2 patients with sideropenic anemia; 2 with Fe overload. The data indicated that $BaSO_4$ was not absorbed. In the Fe-deficient patients ^{59}Fe disappeared from feces only slightly later than ^{131}Br. Absorption of Fe is believed to occur within 2 hr. The proportionate radioactivity of ^{59}Fe and ^{131}Br in feces showed the coefficient always to be lowest in the first sample to show carmine red; in later samples the coefficient increased. This is assumed to be related to absorption of Fe by epithelial cells which are soon lost into the intestinal lumen. The ratio of ^{59}Fe to ^{131}Br increased least in sideropenic anemia patients. In normal and Fe-overload patients ^{59}Fe was present in feces long after ^{131}Br was no longer demonstrable. Normals retained 9-27% of Fe compared to 20-47% absorbed after 10-15 days; Fe-deficient patients 52-77% compared to 53-83% absorbed; and Fe-overload patients 9-12% compared to 23-29% absorbed. The data indicate that in man more Fe is normally absorbed than is ultimately retained in the organism. Only in sideropenic patients is retention nearly as great as absorption. The procedure may be useful for diagnostic purposes without the need for quantitative collection of feces.

6662 STUDIES OF THE SITE OF ACTION OF DEFEROXAMINE. (E.) Brown, E. B. (Washington U. Sch. Med., St. Louis, Mo.), Y.-F. Hwang and J. W. Allgood. J. Lab. Clin. Med. 69(3):382-404, 1967.

Experiments were performed to examine the effect of deferoxamine on (1) Fe in storage depots, (2) Fe release from storage depots, (3) Fe in the process of absorption, and (4) Fe excretion in the bile and feces. Neither Fe dextran nor recently deposited hemoglobin Fe was mobilized from storage depots in significant amounts. Experimentally increasing or decreasing release of Fe from storage depots by phlebotomy or inj. of pyrogens had little effect on deferoxamine-induced urinary Fe excretion. Fe excretion induced by deferoxamine was poorly correlated with Fe stores or with the ferrokinetic measurements in patients with various types of Fe overload. Max. daily urinary Fe excretion induced by the drug was always less than the calculated daily plasma Fe turnover. Parenteral inj. of deferoxamine had little effect on Fe in the process of intestinal absorption. Biliary Fe excretion was slightly enhanced by deferoxamine but apparently does not account for the high fecal excretion in some subjects. No unique site where deferoxamine chelates Fe before its excretion could be identified. Increased Fe stores serve as the ultimate source of iron excreted after deferoxamine inj.; the immediate source of Fe is unknown.

6663 DETERMINATION OF THE INTESTINAL ABSORPTION OF CALCIUM, USING ^{47}Ca.

(Sp.) Litvak, J. (U. Chile, Santiago), E. Oberhauser, A. Vukusic, I. Zanzi, O. Lopez, I. Alliende and R. Armendaris. Rev. Med. Chile 94(7):415-419, 1966.

Among 18 normal, fasting subjects receiving $^{47}CaCl_2$ (20-40 μc, p.o. in milk), mean serum conc. per 1.73 m^2 body surface, expressed as percentages of the total dose found at 1, 2, 3 and 4 hr. after admin., were 6.4%, 10.0%, 12.4% and 12.5%, resp. Among 11 patients with disorders affecting the intestinal absorption of Ca (4 had malabsorption syndrome; 5 had chronic kidney disorders; 2 had osteomalacia resistant to vitamin D), comparable tabulations were 1.7%, 2.8%, 3.1% and 3.1%, resp. In 2 normal subjects and 2 of 3 patients with kidney disease in whom the test was repeated after pretreatment with vitamin D (100,000 U/day for 3 days, i.m.) serum conc. of Ca were increased significantly. Urinary excretion studies, made for all subjects at 4 and 24 hr., yielded largely comparable but less distinct results, with some overlapping between the patient and control groups. It is concluded that the method described represents a simple and highly reliable test for intestinal absorption of Ca.

6664 ABSORPTION OF RADIOACTIVE-TAGGED SUBSTANCES FROM URINARY BLADDER AND ISOLATED SMALL INTESTINAL LOOPS.

(Ger.) Strohmenger, P. (U. Munster, Germany) and H. Sack. Urol. Int. 21(16):538-548, 1966.

Isolated 25-cm long loops were constructed from the lower ileum in dogs; the proximal end was closed; the distal end was brought out to the abdominal surface through an extra incision; intestinal continuity was re-established by a side-to-side anastomosis. Radioactive tracer substances in soln. were instilled into the intestinal loops or into the urinary bladders by well-fitted catheters. Absorption of Ca as $^{45}CaCl_2$ from the intestinal loops was 80% in 90 min. Absorption was rapid and was close to max. within 60 min. No absorption of Ca from the urinary bladder was recorded by the scintillation counter. $NaH_2{}^{32}PO_4$ was 90% absorbed by the small intestine within 90 min. No absorption of ^{32}P occurred in the urinary bladder. Lack of absorption of Ca and phosphate in the urinary bladder favors precipitation of these substances in the upper urinary passageways. Absorption of inulin and paraaminohippuric acid was also tested in intestinal loops and urinary bladders; these urinary clearance substances were marked with radioactive iodine. A complication arose with the labeled inulin which lost radioactive iodine related to pH, from 10% at pH 5 to about 20% at pH 7.2 and 43% at pH 9. No actual absorption of inulin took place either from the intestine or the urinary bladder. Paraaminohippuric acid was absorbed in the intestine (97-99%) and also from the urinary bladder (33-39%) unrelated to pH.

6665 THE EFFECT OF CARDIOTONIC STEROIDS ON THE INTESTINAL ABSORPTION OF ACTIVELY TRANSPORTED AND DIFFUSING SUBSTANCES AND ON THEIR RELATIONSHIP TO Na$^+$ CONCENTRATION AND Na$^+$ TRANSPORT.

(Ger.) Lauterbach, F. (Madaus Biol. Inst., Koln-Merheim, Germany). Biochim. Biophys. Acta 135(2):273-285, 1967.

Absorption, diffusion and transport of Na, K, and Ca, glucose, urea and water in the presence of different conc. of the cardiac glycoside, convallatoxin, were studied in the wall of isolated, everted 5-cm long segments of the small intestine of the rat and guinea pig. A balanced, buffered, isotonic salt soln. containing glucose was used for incubation. When the ionic conc. was altered, isotonicity was maintained. The segment, containing 1 ml of the unaltered salt soln., tied at both ends, was placed in 20 ml of soln. maintained at 37°C in an atmosphere of O_2 for a period of 45 min. Conc. of substances in the incubation fluid were analyzed. The transport of substances in the intestinal wall of the rat was unchanged in the presence of convallotoxin up to 0.4 mM. In the guinea pig increasing conc. of glycoside caused an increasing but proportional inhibition of all absorption processes determined. The ratios of the absorbed substances, water, glucose, Na and Ca remained constant. The glycoside had no effect upon the passive diffusion of urea across the wall of the guinea pig intestine. It is concluded from the results that the cardiotonic steroid diminished intestinal transport processes by inhibiting the transport of the Na and that the maintained constant ratio of Na to the other substances then must reduce the amount of these other substances passing through the intestinal wall.

6666 WATER AND ELECTROLYTE CONTENT OF HUMAN ILEOSTOMY FLUID AFTER d-ALDOSTERONE ADMINISTRATION.

(E.) Levitan, R. (New England Med. Ctr. Hosp., Boston, Mass.) and K. Goulston. Gastroenterology 52(3):510-512, 1967.

ix balance studies were performed on 4 patients 23-40 yr.) with established well-functioning leostomies. All had a total colectomy and leostomy for idiopathic ulceritis, were in good ealth, and had salt and fluid intake maintained t 9 g NaCl and 2600 ml/day, resp. After 3 onsecutive control days, 2 mg D-aldosterone as admin. (i.v. in 50 ml 5% dextrose for 20 min.) n the morning of each of the next 3 days and alance studies were continued 3-4 additional onsecutive days after the last aldosterone inj. ollections (24 hr.) of ileostomy excreta were nalyzed for vol. and wet wt.; Na and K conc. in upernatant fluid were analyzed by flame hotometry; Cl was determined by potentiometric itration (all in duplicate). Values in control eriods before and after aldosterone were compared by variance analysis with the study periods or individuals separately and for the entire roup. Both methods of analysis showed no ignificant alterations in vol., wet wt., or Na, , and Cl conc. in the study period as compared ith the controls. Electrolyte output was also naffected by hormone admin. Although the mean alues for Na output decreased and those for K ncreased during study, these differences were ot significant. The Na:K ratio also remained onstant. In all dogs, the 24-hr. urine volume nd Na excretion decreased significantly and K itput increased during aldosterone admin. No ffect of D-aldosterone on the handling of Na, and Cl by the small intestine could be emonstrated.

67 KINETIC RELATIONS OF THE Na-AMINO ACID INTERACTION AT THE MUCOSAL BORDER OF TESTINE. (E.)

Curran, P. F. (Harvard Med. h., Boston, Mass.), S. G. Schultz, R. A. Chez d R. E. Fuisz. J. Gen. Physiol. 50(5):1261-1286, 67.

udies on the relation between unidirectional uxes of Na and amino acids (3.3 mM alanine, 20 valine, 3.3 mM alanine, 20 mM leucine) across e mucosal border of rabbit ileum are reported. a constant Na conc. in mucosal bathing soln. asic Ringer), amino acid influx obeyed chaelis-Menten kinetics, allowing determination max. influx and K_t (apparent Michaelis nstant). Reduction in Na conc., using choline substitute cation, caused an increase in K_t r alanine but had no effect on max. alanine flux. A linear function of Na conc. was given $1/K_t$. Similar results were observed with valine d leucine, both of which competitively hibited alanine influx in the presence and sence of Na. A model for the transport system suggested which involves combination of Na d amino acid with a single carrier or site ading to penetration of both solutes. It edicts that alanine should cause an increase Na influx and that the ratio of (extra Na ux)/(alanine flux) should vary with Na conc. e observed relation agrees closely with the edicted values for Na conc. from 5-140 mM. e results support the hypothesis that interactions between Na and amino acid transport depend in part on a common entry mechanism at the mucosal border of the intestine.

6668 ALANINE AND SODIUM FLUXES ACROSS MUCOSAL BORDER OF RABBIT ILEUM. (E.)

Schultz, S. G. (Harvard Med. Sch., Boston, Mass.), P. F. Curran, R. A. Chez and R. E. Fuisz. J. Gen. Physiol. 50(5):1241-1260, 1967.

An *in vitro* study of the unidirectional influx of Na and L-alanine from mucosal soln. (modified Ringer) into epithelium of rabbit ileum is reported. Influx of alanine is approx. 2.2 μmoles/hr. cm^2 in the presence of 140 mM Na. The influx is inhibited if the NaCl in the mucosal soln. is replaced by choline-Cl, mannitol, KCl, Tris-Cl or LiCl. Despite the strong dependence of alanine influx on Na in the mucosal soln., it is uninfluenced by marked reduction in intracellular Na pools. Alanine influx is not dependent on intracellular alanine conc. Na influx was markedly inhibited by the presence of Li. It is suggested that transport of Na across the mucosal border cannot be attributed to simple diffusion, although the net flux across this surface is in the direction of the electrochemical potential difference.

6669 THE INFLUENCE OF 2-AMINOETHYLENISOTHIURONIUM-HYDROBROMIDE (A) ON ^{22}Na-TRANSPORT IN THE ISOLATED SMALL INTESTINE OF NORMAL AND IRRADIATED RATS. (Ger.)

Phan Van Duyet (Charles U., Prague), V. M. Nejtek and Z. Dienstbier. Strahlentherapie 132(3):448-453, 1967.

Five groups of white rats (200-220 g) were used in these tests: (1) Controls; (2) The direct action of the title compound (A) upon ^{22}Na-transport in the isolated small intestine of normal, nonirradiated rats, both inner and outer soln. contained 150 μg A/ml; (3) The action of A upon ^{22}Na-transport 15 min. after i.p. inj. of 150 μg/g body wt., nonirradiated rats; (4) ^{22}Na-transport 48 hr. after whole body X-irradiation (800 r); (5) ^{22}Na-transport 48 hr. after whole body irradiation (800 r). Each rat was inj. i.p. with 150 μg/g A 15 min. prior to irradiation; (6) ^{22}Na-transport, 48 hr. after inj. i.p. of 150 μg/g A, nonirradiated rats. Ten-cm long sections of jejunum were used from the rats in all 5 groups; the inner fluid consisted of 1 ml Krebs-Ringer soln. containing 2 mg glucose per intestinal segment with the ends ligated; the outer fluid had the same composition with the addition of 60 μc ^{22}Na; 12 such segments were incubated in 600 ml of the outer fluid at 37° for 60 min.; the outer fluid was oxygenated. After incubation 1 ml of soln. was removed from each segment; the segment was blotted with filter paper, then dried for 24 hr. at 105°C. The radioactivity of the soln. as well as the dried section of intestine was measured by a gamma scintillator. The transport of ^{22}Na in Group 2 was increased *in vitro* 6.7% over the controls and the incorporation of ^{22}Na decreased 9.92%. Group 3 had a 6.2% decrease in transport and 20.5% increase in incorporation. Group 4 had a 22.94% decreased transport and 18.4% increased incorporation. Group 5 transport was normal; incorporation was increased 26.8%. In Group 6 both transport and incorporation were normal. The effect of A upon the intestinal tissue itself is obscured in the intact animal where A acts upon both the circulatory and respiratory systems. A does not inhibit the increased incorporation of ^{22}Na due to irradiation. Transport and incorporation values had become normal 48 hr. after admin. of A.

6670 SMALL INTESTINAL GLUCOSE TRANSPORT. PROXIMAL-DISTAL KINETIC GRADIENTS. (E.) Rider, A. K. (Columbia U., New York City), H. P. Schedl, G. Nokes and S. Shining. *J. Gen. Physiol*. 50(5):1173-1182, 1967.

Proximal and distal segments of rat small intestine were perfused *in situ* at 2 different rates with isotonic soln. containing glucose at 25-600 mg/100 ml. Absorption was measured as rate of disappearance of glucose from lumen. Previous studies had not used intraluminal glucose conc. above and below blood glucose. Absorption was more rapid from the proximal segment. In both segments absorption was independent of perfusion rate or method of glucose analysis (^{14}C-counting or Somogyi method). This suggests that unidirectional flux out of the bowel is much greater than that into the bowel. Neither segment showed rate-limiting kinetics and Michaelis-Menten analysis could not be applied. The 2 segments gave different curves of absorption rate as a function of conc. At higher conc. absorption rate continued to increase much more rapidly in the proximal than in the distal segment. Presently accepted mechanisms of glucose transport are not capable of accounting for these results.

6671 INVESTIGATIONS ON THE INSULIN EFFECT ON THE INTESTINAL ABSORPTION OF GLUCOSE AND FRUCTOSE. (Ger.) Mehnert, H. (U. Munich, Germany), H. Förster and G. Haslbeck. *Diabetologia* 3(1):23-29, 1967.

Fasted, mature rats were inj. with a fast-acting insulin, or, for long-term insulin treatment, with a depot insulin s.c. Two methods were used to introduce the test soln. into the intestinal tract; in the first, 1.3 ml of soln. containing 10% polyvinylpyrrolidone and 30% or 50% sugar was introduced into the stomach by intubation. The animals were killed 15, 30, or 60 min. after the beginning of the test, the abdomen opened and the digestive tract ligated at the cardia, the pylorus and the ileocecal junction; the tract was then excised, cooled and washed; the contents of stomach and intestine were separately washed out with known quantities of ice-cold distilled water. In the second method, the rat under anesthesia was laparotomized and catheters tied into the upper duodenum and lower ileum; the abdomen was then closed and the small intestine perfused continuously with soln. warmed in a water bath to body temperature. This method permitted direct measurement of the absorptive capacity of the small intestine in the living rat. Through the use of 60 ml of the test soln. the conc. of the test substance in the intestinal lumen was only slightly changed during the test period. The polyvinylpyrrolidone (which is not absorbed) served as an index of the amount of water absorbed. After the admin. of the monosaccharides by stomach tube an accelerated absorption of glucose, but not of fructose, was seen under the action of insulin; the glucose absorption was more rapid however, only when larger amounts of glucose/unit time were offered to the intestinal surface; further investigation revealed that accelerated absorption of glucose after insulin inj. was caused by the more rapid emptying of the stomach; intestinal absorption of fructose is so much slower than absorption of glucose that faster gastric emptying has little effect on the rate of fructose uptake. When glucose and fructose were perfused through the intestine, no differences between insulin-treated animals and the controls were found. This observation refutes the idea that low blood sugar levels cause faster glucose absorption by increasing the conc. gradient between intestine and blood. When insulin was inj. i.v. 10 min. before the perfusion of the small intestine, there was a significant inhibition of absorption. The range of absorption was from 28.3% (1 U insulin) to 17.3% (80 U of insulin), whereas the av. absorption of controls receiving insulin-free inj. and no inj. was 35.5%. This inhibition of absorption in insulin-inj. animals may have been due to decreased metabolic rate caused by hypoglycemia. Pretreatment of animals with insulin for 1 wk. did not cause accelerated glucose absorption.

6672 EFFECT OF AMINO-ACIDS ON THE TRANSPORT OF BOVINE IMMUNE LACTOGLOBULIN ACROSS NEWBORN PIG INTESTINE. (E.) Smith, M. W. (Inst. Animal Physiol., Babraham, Cambridge, England) and A. E. Pierce. *Nature* (*London*) 213(5081):1150-1151, 1967.

Piglets removed from the sow immediately after birth were studied within 2 hr. of birth. The whole of the small intestine was divided into 10 segments of equal length and segments 6 and 7 were used. Everted sacs were formed from these segments and were partly filled with 0.3 ml of bicarbonate saline and incubated in bovine colostrum, dialyzed previously against bicarbonate saline for 2 hr. at 37°C. An amino acid was sometimes added to the bovine colostrum after dialysis in a conc. of 10

oles/liter. Transmural potentials were
corded during incubation; fluid transfer was
lculated at the end of incubation. Control
rosal transfers were: bovine immune lacto-
obulin, 61.6 μg/g/hr.; fluid, 0.5 ml/g/hr.;
ucose, 1.9 mg/g/hr. The control transmural
tential was 4.4 millivolts. L-Alanine did not
ve any effect. L-leucine inhibited protein trans-
rt more than 60%, fluid transport nearly 40%
d glucose nearly 70% with no effect on trans-
ral potential. The effect on protein trans-
rt may have been secondary to water and glucose
hibition. L-Methionine inhibited protein
ansport more than 40% without changing
ansmural potential or serosal transfer of
uid or glucose. None of these effects were
en with the D-isomers. The specificity of L-
thionine as an inhibitor of protein transport
plies a direct action on some part of the
otein-transferring mechanism; the absence of
fect with the D-isomer eliminates the
ssibility that the inhibitory action is
pendent on electrical charge carried by the
lecule.

73 ALANINE TRANSPORT ACROSS ISOLATED
RABBIT ILEUM. (E.) Field, M. (Beth
rael Hosp., Boston, Mass.), S. G. Schultz and
F. Curran. Biochim. Biophys. Acta 135(2):
5-243, 1967.

en both sides of isolated segments of ileum of
w England white rabbits (2.5-4.0 kg) were
thed in Ringer's soln. with 140 mM Na and 5
L-alanine, a net flux of L-alanine from
cosal to serosal soln. of 1.2 μmoles/hr. cm^2
s observed. The flux from mucosa to serosa
s 10 times that in the opposite direction.
t flux of L-alanine almost equaled the in-
ease in active Na flux caused by the addition
5 mM L-alanine to the serosal soln.
placement of Na with choline or addition of
$^{-4}$ M ouabain to serosal soln. in the presence
Na markedly inhibited net transport of L-
anine. In both cases this is due to a decrease
the flux from mucosa to serosa. Transport is
t significantly inhibited by addition of
abain to mucosal soln. alone. Net transport
D-alanine in the absence of a conc. difference
d accumulation of D-alanine to high conc. by
is tissue was observed. Addition of ouabain
replacement of Na with choline in the
cubation medium markedly inhibited the
cumulation.

74 EFFECT OF S-(1,2-trans-DICHLOROVINYL)-
L-CYSTEINE ON THE TRANSPORT OF AMINO
IDS AND GLUCOSE BY EVERTED SEGMENTS OF RAT
ALL INTESTINE. (E.) Chang, T. (Parke, Davis
Co., Ann Arbor, Mich.), J. Lewis and A. J.
azko. Biochim. Biophys. Acta 135(2):244-255,
67.

(1,2-trans-dichlorovinyl)-L-cysteine (DCVC)
ppressed active transport of glucose, glycine
and certain L-amino acids including alanine, valine, histidine, leucine and phenylalanine (everted sacs of small intestine of 180-240 g albino male Holtzman rats). The inhibition was proportional to the conc. of DCVC and was not readily reversed by washing. Passage of D-phenylalanine in both directions showed no marked changes in permeability of sacs in the presence of DCVC. The inhibition of uptake of L-phenylalanine by this tissue seemed to be a competitive process. At low conc. DCVC itself underwent active transport, with greatest transport in the mid-jejunum and least in the duodenum. Transport of DCVC was inhibited by absence of Na, anaerobiosis, dinitrophenol and low temperature.

6675 DISACCHARIDASE: LOCALIZATION IN
HAMSTER INTESTINE BRUSH BORDERS.
(E.) Johnson, C. F. (U. Chicago Sch. Med., Ill.).
Science 155(3770):1670-1672, 1967.

The brush borders were prepared from 15 cm of jejunum from 2 or 3 adult hamsters. Suspended in ethylenediaminetetraacetate the brush borders were digested with papain activated by cysteine and 30 mEq/liter of K at 37°C for 10 min. The mixture was cooled and centrifuged at 90,000 g for 90 min. The resulting pellet was prepared for electron microscope examination. The supernatant was further centifuged at 140,000 g for 5 hr. The sediment produced, as well as the supernatant, were prepared for examination. Phosphotungstic acid (2%) was used for negative staining. The specific activities of invertase and maltase were determined for all samples. The highest activity was in the 140,000 g sediment. It was found that digestion with activated papain removes knobs 60 Å in diameter from the plasma membrane. They were attached to the plasma membrane but were not an integral part of it. The activities of the disaccharidases, invertase and maltase were found to reside in the knobs and were not found with the plasma membrane. The author concludes that the knobs and enzyme activities are contained in the glycocalyx or fuzzy coat, external to the plasma membrane of the microvillus.

6676 EFFECT OF DIET UPON INTESTINAL
DISACCHARIDASES AND DISACCHARIDE
ABSORPTION. (E.) Deren, J. J. (State U. New
York, Brooklyn), S. A. Broitman and N. Zamcheck.
J. Clin. Invest. 46(2):186-195, 1967.

Feeding a carbohydrate-containing diet for 24 hr. to rats previously starved for 3 days led to a two-fold increase in total intestinal sucrase and sucrase-specific activity. Specific activity of maltase was similarly increased but lactase activity was unaffected. A diet containing sucrose resulted in a greater increase in sucrase than maltase activity, whereas the converse was true of a maltose-containing diet. Carbohydrate-free isocaloric diet increased total intestinal sucrase; sucrase-specific activity was unchanged. Adrenalectomized rats maintained on 1.0% salt intake had normal sucrase and maltase levels. Steroid admin. did not increase their activities. The response to sucrose feeding was similar in control and adrenalectomized rats indicating the absence of steroidal control on sucrase and maltase activity in adult animals. Sucrose hydrolysis by intact cells studied in the intestinal ring preparation was more rapid in animals fed sucrose. The increased enzyme levels in homogenates after dietary manipulation was reflected in the results of intestinal perfusion studies. Sucrose hydrolysis increased two-fold and fructose absorption four-fold in animals fed sucrose when compared to either fasted or casein-fed rats.

6677 RAT SMALL-INTESTINAL β-GALACTOSIDASES. INFLUENCE OF pH ON THE HYDROLYSIS OF DIFFERENT SUBSTRATES. (E.) Dahlqvist, A. (U. Lund, Sweden) and N. G. Asp. Biochem. J. 103(1): 86-89, 1967.

The influence of pH and type of buffer on the hydrolysis of lactose and 4 hetero-β-galactosides (phenyl-β-galactoside, 6-bromo-2-naphthyl-β-galactoside, o-nitrophenyl-β-galactoside and p-nitrophenyl-β-galactoside) by homogenates of adult albino rat small-intestinal mucosa was investigated using the following buffers: glycine-HCl at pH 1.5-3.5, sodium citrate or sodium acetate at pH 3.0-6.5, sodium phosphate at pH 6.0-8.0, and glycine-NaOH at pH 8.0-9.0. At least 2β-galactosidases were found to be present in the homogenates, one with optimum pH 3-4 and another with optimum pH 5-6. The enzyme with the lower pH optimum was mainly a heterogalactoside, and it hydrolyzed lactose slowly; the second enzyme was chiefly a disaccharidase, since it hydrolyzed lactose much more quickly than the heterogalactosides. Citrate had an inhibitory effect on the activity of 6-bromo-2-naphthyl β-galactosidase at pH 3-4; however, citrate did not influence 6-bromo-2-napthyl β-galactosidase activity at pH 5-6 or the hydrolysis of the other substrates at any pH.

6678 INTESTINAL DISACCHARIDASE ACTIVITY IN PREMATURE NEONATES AND NEONATES BORN AT TERM. (It.) Apollonio, T. (U. Milan, Italy), O. Palumbo-Vargas and G. Cevini. Minerva Pediat. 18(37):2183-2185, 1966.

Preparations of intestine were derived at autopsy from 10 premature infants and 2 neonates born at term. Preparations were also derived by biopsy from 2 adult subjects. For these 3 groups, mean cellobiase activity in terms of U/g mucosa was 2.6 (range = 0.4-8.8), 3.3 (range = 3.0-3.6) and 2.9 (range = 2.8-3.0), resp. Comparable tabulations for trehalase activity were 4.0 (range = 0.5-15.4), 5.2 (range = 2.1-8.3) and 6.4 (range = 3.3-9.5), resp.; for palatinase activity, they were 0.5 (0.07-1.10), 2.0 (1.80-2.30) and 0.9 (0.60-1.20) resp. There were no statistically significant differences between the 3 groups, as concerned the mean values found for maltase, lactase or sucrase activity; in all 3 cases, the range was extremely variable. Note is made that these findings in human subjects are strongly at variance with reported experimental findings in rats and other animals.

6679 EFFECT OF E.D.T.A. ON THE INTESTINAL ABSORPTION. (It.) Giorgi, G. (U. Camerino, Italy) and G. Segre. Boll. Soc. Ital. Biol. Sper. 42(20):1438-1440, 1966.

Adult rabbits (both sexes 1.5-2.0 kg) received para-aminohippuric acid in the form of its Na salt (50 mg/kg, i.v.) followed by determinations of serum conc. of the same substance at interval between 5-90 min. Each animal then underwent laparotomy and received 1 g/kg intraduodenally, with a further determination of serum conc. made at 210 min. As compared to controls receiving para-aminohippuric acid alone, intraduodenally, animals receiving ethylenediaminotetraacetic acid 100, 250 or 500 mg at the same time and by the same route, showed significantly increased intestinal absorption of para-aminohippuric acid. The effect was directl dose-related.

6680 PITUITARY-ADRENAL SUPPRESSION FOLLOWING INTRARECTAL ADMINISTRATION OF DEXAMETHASONE-21-PHOSPHATE. (E.) Sparberg, M. (Wilford Hall USAF Hosp., Lackland AFB, Tex.), R. Jensen, S. C. Beering and I. Shannon. Gastroenterology 52(3):519-520, 1967.

Basal blood samples were collected in the morning in 2 groups of healthy men (17-22 yr., in military service after 8 wk. basic training). A p.o. dose of 1 mg dexamethasone or dexamethaso 21-phosphate in 45 ml water as a retention enema was admin. at that time and samples collected again after 7 hr. Sera were analyzed for free (unconjugated) 17-hydroxycorticosteroid content. The control values for serum 17-hydroxycorticosteroids agreed with the accepted normal diurnal pattern. A significant decrease was observed with dexamethasone in 7 hr. This indicates that pituitary-adrenal suppression occurs following admin. of a small dose of dexamethasone in the morning as well as at night. A similar and significant fall was observed in the dexamethasone-21-phosphate group. Therefore, therapeutic amounts of intrarectal corticosteroi may produce significant pituitary-adrenal suppression regardless of time of admin. It is suggested that these short-term results may be applicable to long-term therapy, and a suggested alternative might be the use of the less effective, nonabsorbable preparation or the

:ermittent intrarectal admin. of soluble
rticosteroids.

31 METABOLISM AND RECONJUGATION *IN VIVO*
OF (7α-^{3}H)ANDROSTENDIONE, (7α-^{3}H)-
)ROSTENOLONE, AND (7α-^{3}H)ANDROSTENOLONE
LFATE IN THE WALL OF THE HUMAN INTESTINE.
er.) Knapstein, P. (U. Mainz, Germany), L.
eiber, F. Wendlberger and G. W. Oertel.
ppe Seyler. *Z*. *Physiol*. *Chem*. 348(4):401-404,
57.

e first patient received (7α-^{3}H)androstendione
,17) with 7,000,000 ipm and (7α-^{3}H)-
drostenolone with 13,500,000 ipm in the lumen
the upper duodenum; in the following 30 min.
mples of blood were withdrawn from the
odenal vein. The second patient received
:-^{3}H)androstenolone sulfate with 70,200,000
n in the lumen of the upper ileum; from
-120 min. later blood samples were withdrawn
om the iliac vein. The third subject received
inj. of (7α-^{3}H)androstenolone with
,140,000 ipm in the upper mesenteric artery;
ood was immediately drawn from the correspond-
g mesenteric vein. The fourth subject
ceived (7α-^{3}H)androstenolone sulfate with
,800,000 ipm in the same manner as the third
oject; collection of blood was also the same.
tal C$_{19}$-steroids were extracted from the blood
mples and separated into free steroids,
eroid sulfatides, steroid sulfates, and
eroid glucuronides, and metabolic products
in subject 1, 3 in subject 2, and 1 in
ojects 3 and 4). In the first patient 79.5%
the total free radioactive androstendione and
drostenolone were conjugated to sulfate and to
ucuronic acid in the intestinal wall and 14%
tabolized. It was impossible to know which
mpound gave rise to particular metabolites.
is test, however, gave rise to more metabolites
th greater conc. than the other 3. These
oducts, some in traces only, were (a) "polar
g steroids", (b) androstenolone, (c) 5,β-
drostanolone, (d) androsterone, (e) androstendi-
e, (f) estriol, (g) estradiol, and (h)
trone. Androstendione and androstenolone, the
iginal steroids, are also classed as products.
dioactive androstenolone sulfate introduced
to the intestinal lumen of the second patient
s recovered in the venous blood as 1) 80.3%
eroid sulfatide; 2) 14.4% as steroid sulfate;
4.9% as free steroid; and 4) 0.4% as steroid
ucuronide. Among the metabolites isolated
om sulfatide and sulfate conjugates, 98.1% of
e radioactivity was from androstenolone, and
ly 1.7% from 5β-androstanolone, and 0.13%
om androsterone. Although the conversion to
lfatide from sulfate was massive, there was
ry little metabolism of the steroid itself.
e inj. of free (7α-^{3}H)androstenolone (third
tient), after a single passage through the
ood vessels in the wall of the intestine,
sulted in 93.7% remaining unchanged, 5.6%
njugated to sulfate and 0.7% bound to
ucuronic acid. In the fourth subject 72.9%
of the androstenolone sulfate was converted to sulfatide; no metabolism of the steroid was demonstrable.

6682 AMMONIA MOVEMENT IN THE SMALL INTESTINE: PREFERENTIAL TRANSPORT BY THE ILEUM. (E.) Mossberg, S. M. (33 Quaker Ridge Rd., New Rochelle, N. Y.) and G. Ross. *J*. *Clin*. *Invest*. 46(4):490-498, 1967.

Isolated, surviving sacs of everted small intestine were used to characterize ammonia transport in the golden hamster. Jejunal and ileal sacs incubated aerobically in ammonia-free test soln. liberated the same quantity of ammonia as did sacs that were filled and immediately emptied of their contents, indicating no significant evolution of metabolic ammonia. Under aerobic conditions, ileal sacs transferred a soln. of high ammonia content from the mucosal surface to the serosal surface against a conc. gradient. This transport was not glucose dependent and exhibited first-order Michaelis-Menten kinetics. Inhibition of absorption occurred with anaerobiosis, 2,4-dinitrophenol, and NaCN. In jejunal segments ammonia was not transported against an adverse chemical gradient. Ileal ammonia absorption was accompanied by bicarbonate secretion and acidification of the serosal soln. Both bicarbonate movement and pH gradients were abolished by inhibitors of ammonia transport. In the jejunum, the absence of ammonia movement occurred in association with minimal bicarbonate secretion and no appreciable change in serosal pH. Despite creation of H gradients augmenting or retarding ammonia absorption by nonionic diffusion, ammonia movement was unaffected, acidification of serosal contents did not augment ammonia absorption and alkalinization caused no inhibition. In the absence of bicarbonate ion, ammonia transport did not occur. It is suggested that ammonia is absorbed in the ileum by active ionic transport.

6683 THE INTRACELLULAR DISTRIBUTION OF [1-^{3}H]CHOLECALCIFEROL IN THE INTESTINE OF VITAMIN D-DEFICIENT AND -SUPPLEMENTED RATS. (E.) Wilson, P. W. (U. Cambridge, England), D. E. M. Lawson and E. Kodicek. *Biochem*. *J*. 103(1):165-171, 1967.

Vitamin D-deficient and -supplemented male and female piebald weanling rats were admin. [1-^{3}H]-cholecalciferol (2.5 or 500 µg/rat), and the intracellular distribution of the vitamin in the intestinal mucosa was studied. Cholecalciferol conc. was highest in a fraction consisting of brush borders and nuclei. The microsomal fraction contained a higher conc. of cholecalciferol than the mitochondrial fraction in deficient rats, irrespective of the dose; however, in vitamin D-supplemented rats, the conc. was the same in the 2 fractions. There was appreciable metabolism of cholecalciferol in supplemented rats only, and the metabolites were found predominantly in the mitochondrial fraction. Cholecalciferol was bound more tightly to the microsomal fraction than to the mitochondrial fraction. *In vitro* experiments revealed that all of the intracellular particles combined with the vitamin when dissolved in ethanol or bound to albumin. Nevertheless, such an uptake did not account for the high conc. of radioactivity found *in vivo* in the fraction containing nuclei and brush border, nor for the tightly bound vitamin in the microsomal fraction.

6684 FLUID TRANSFER IN THE EVERTED HUMAN GALLBLADDER. (E.) Onstad, G. R., (Mayo Clin., Rochester, Minn.) L. J. Schoenfield and J. A. Higgins. *J*. *Clin*. *Invest*. 46(4): 606-614, 1967.

The rates of fluid transfer across human gallbladders (47, all of which contained gallstones), obtained at cholecystectomy from patients having chronic cholecystitis with cholelithiasis, were determined by measurement of wt. changes of everted preparations under controlled conditions. The modified Ringer's bicarbonate bathing soln. contained (in mmoles/liter) Na 150, K 4.5, Ca 2.5, Mg 0.5, Cl 130, HCO_3 25, HPO_4 1.2, SO_4 0.5 and dextrose 10. Of 47 gallbladders, 27 gained wt. (av. gain was 1.00 g/hr. or 13% of the initial intraluminal vol./hr.) and 20 lost wt. (at a mean linear rate of 7%/hr.). Active transport of fluid from the mucosal to serosal surface was indicated, since wt. gain occurred with the same soln. on both sides of the membrane and against hydrostatic, osmotic and potential differences. The fluid transferred was isotonic to the bathing soln., with respect to Na. Metabolic inhibitors (NaCN and iodoacetic acid, at 1×10^{-3} mole/liter, and dinitrophenol, at 1×10^{-4} mole/liter) and temperature extremes inhibited wt. gain. In 10 preparations, the av. potential difference across the gallbladder wall after 30-40 min. of wt. gain was 6 millivolts, with the mucosal surface negative to the serosal surface. Muscle contractions in this *in vitro* preparation were related to the rates and direction of fluid movement. Cholecystokinin (0.50 dog U/ml, with a range of 0.23-2.94) increased muscle activity and caused wt. loss in preparations that previously had gained wt. Norepinephrine (0.052 mg/ml, with a range of 0.008-0.169) caused wt. gain or increased wt. gain in all preparations tested. The direction of net fluid movement in the isolated everted human gallbladder was determined by the opposing forces of active mucosal transport and a filtration pressure generated by muscle contractions. Of the gallbladders examined, 9 of 11 that gained wt. and 4 of 19 that lost wt. were normal histologically. Chronic inflammation was present only in the submucosal and muscle layers. Mucosa from 7 gallbladders, obtained after 50-150 min. of wt. gain, was examined electron-microscopically and showed ultrastructural detail similar to that of the normal human gallbladder.

6685 KINETIC FORMULAS OF ABSORPTION IN REFERENCE TO INTESTINAL BLOOD FLOW. (Ger.) Winne, D. (U. Tubingen, Germany) and H. Ochsenfahrt. *J*. *Theor*. *Biol*. 14(3):293-315, 1967.

The kinetics of absorption (based upon solubilitie conc. of solute and solvent, diffusion, osmotic pressure and permeabilities) is considered step by step from the most simple case, a 2-compartment model where the compartments are separated by a semipermeable membrane, or a layer of cells or multiple layers which, in this sense, act as a single membrane; in which case 1 compartment can be considered the lumen of the intestine (intestinal fluid) and the other compartment the vascular lumen (blood) with tissue layers (membrane) separating the compartments. Then the movement of a single species of molecule or ion from 1 side of the membrane to the other, as the influx, I, from the intestinal fluid into the blood plasma is equal to $k_1 \times F_D \times C_D$ where k_1 is the permeability constant, F_D is the conc. in the membrane, and C_D is the conc. in the intestinal fluid. $\bar{I} = K_1 \times F_D \times C_D$ is opposed by the same set of factors (of different magnitudes) operating on the other side of the membrane. The authors continue to 3-compartment models such as blood, interstitial fluid, and intestinal fluid. They then introduce special cases, as zero conc. of a molecular species in 1 compartment, radioactive markers, both solute and solvent, and time-dependent conc. of solutes. The treatment is simple, straightforward and clear. Some explanations may be oversimplified; however, the formulas are true.

6686 THE PANCREAS AND IRON ABSORPTION: CURRENT VIEWS. (E.)(Rev.) Davis, A. E. (Prince Henry Hosp., Sydney, Australia) and J. C. Biggs. *Amer*. *J*. *Dig*. *Dis*. 12(3): 293-302, 1967.

6687 RELATION OF EXOCRINE PANCREAS TO DIGESTIVE ABSORPTION OF IRON. (Fr.) Tura, S. (U. Bologna, Italy), M. L. Ricci Bitti and M. Baccarani. *Nouv*. *Rev*. *Franc*. *Hemat*. 7(2):284-287, 1967.

6688 SUCCINIC ACID AND IRON ABSORPTION. (E.) Boddy, K. (Glasgow Roy. Infirm., Scotland) and G. Will. *Scot*. *Med*. *J*. 12(5): 183-185, 1967.

6689 LACTOSE AND UTILIZATION OF CALCIUM IN MAN. PRELIMINARY OBSERVATIONS IN AGED OSTEOPOROTIC WOMEN. (Fr.) Pansu, D. (Fac. Med., Lyon, France), Y. Dupuis, J. Bernard and P. L. Fournier. *C*. *R*. *Acad*. *Sci*. [*D*] (*Paris*) 264(18):2207-2210, 1967.

6690 ABSORPTION OF METHIONINE FROM THE GALLBLADDER *IN VIVO* AND *IN VITRO*.

s.) Zamychkina, K. S. (Inst. Norm. Path.,
siol., Moscow) and L. V. Kriukova. Biull.
p. Biol. Med. 63(4):28-30, 1967.

1 CALCULATION OF RATE CONSTANTS FOR
ABSORPTION AND ELIMINATION OF DRUGS.
) Brändström, A. (A. B. Hassle Res. Lab.,
eborg, Sweden) and J. Sjogren. Acta Pharm.
c. 4(2):147-156, 1967.

2 SITES OF ABSORPTION OF PENTAERYTHRITOL
TETRANITRATE. (E.) Dicarlo, F. J.
rner-Lambert Res. Inst., Morris Plains, N. J.),
B. Coutinho and M. C. Crew. Arch. Int.
rmacodyn. 167(1):163-170, 1967.

6693 RECENT DEVELOPMENTS IN INTESTINAL ABSORPTION OF LIPIDS. (It.) Gandolfi, L. (U. Bologna, Italy). Riv. Gastroent. 18(5):277-316, 1966.

6694 THE ROLE OF BILE SALTS IN THE INTESTINAL ABSORPTION OF LIPIDS. A REVIEW. (E.)(Rev.) Kavin, H. (U. Witwatersrand Med. Sch., Johannesburg, South Africa). Leech (Johannesburg) 36(4):108-111, 1966.

6695 LACTASE ACTIVITY OF SMALL INTESTINE MUCOSA OF LAMBS. (It.) Manunta, G. (U. Sassari, Italy), P. Nuvole and S. Casu. Boll. Soc. Ital. Biol. Sper. 43(2):99-102, 1967.

See also abstract nos.: 7043,7310

6696 THE MAXIMAL HISTALOG TEST OF GASTRIC SECRETION. A COMPARISON WITH THE HISTAMINE INFUSION TEST IN MAN. (E.) Johnston, D. (Roy. Infirm., Sheffield, England) and D. W. Robinson. Brit. J. Surg. 54(3):207-210, 1967.

Subjects were 17 men (24-67 yr., av. 40) with duodenal ulcer (12), gastric ulcer (2), dyspepsia without X-ray evidence of a gastrointestinal abnormality (3). Histamine (with 36% histamine base) was admin. i.v. (0.04 mg/kg/hr.) by a slow inj. pump for 2 hr. Mepyramine maleate was inj. (50 mg; 100 mg in those over 70 kg) 5 min. before infusion. Betazole was inj. s.c. into the flexor surface of the forearm (2 mg/kg). No antihistamine was given. Each subject underwent both tests, with minimal interval of 1 day between tests, and tests given in random order. Stomach contents of fasting subjects were aspirated by nasogastric suction and discarded, and continuous suction with air-forced tube patency was maintained. In all, the stomach was emptied completely before drug admin., and specimens were taken at 15-min. intervals over 2 hr. Sample vol. were measured and acid conc. determined by titration with NaOH. Max. acid outputs were nearly identical after both tests. Mean difference between output after histamine and that after betazole was 0.056 mEq/15 min. The peak 30-min. ('max. acid output' was acid output in 2 consecutive 15-min. periods giving highest reading) occurred in the last 45 min. in 12 of the histamine tests, but at 45-75 min. in most (6) of the betazole. The peak was reached earlier in the betazole test, but scatter was greater. Spontaneous secretion was 15.5% of the peak secretion in response to histamine in 12 tests. There was no significant difference between conc. and outputs of pepsin in response to the 2 tests. Side effects were similar and mild, but betazole showed a slight superiority: 11 of 17 had no preference; 5 preferred betazole; 1 histamine Subjects were more tired with histamine than with betazole. Severe reactions were seen in 5% of the 140 histamine tests. It is concluded that, until gastrin becomes freely available, betazole (2 mg/kg) provides the best means of eliciting 'max.' gastric secretion.

6697 A CLINICAL EVALUATION OF THE MAXIMAL HISTALOG TEST. (E.) Goldenberg, J. (U. Tennessee Coll. Med., Memphis), A. J. Cummins and M. L. Gompertz. Amer. J. Dig. Dis. 12(5): 468-474, 1967.

Subjects were 131 patients (13-80 yr.) with: no demonstrable gastrointestinal disease (= controls, 42); duodenal ulcer (48); gastric ulcer (11); gastric carcinoma (3); after subtotal gastrectomy with or without vagotomy (9); pernicious anemia (18). Gastric analyses were performed in each after an overnight fast. Residual gastric juice was emptied, a nasogastric tube was connected to continuous suction and basal aspiration was conducted for two 30-min. samples, with forced-air tube patency. The tube was positioned fluoroscopically in 67 of 131. In 30, 50 mg diphenhydramine was given i.m. 30 min. after beginning of test. After 1 hr., betazole was inj. (2 mg/kg, never more than 200 mg) s.c. Four more 30-min. gastric secretion samples were obtained. Vol. and pH of each sample was measured and acid conc. determined by titration with NaOH. Acid output (mEq/hr.) was expressed as the combination of values of 2 consecutive 30-min. samples (0-60, 30-90, 60-120 min.) afte betazole inj. Due to range of doses and data, the variance ratio was used. Of 48 with duodena ulcer, 22 had the tube positioned fluoroscopica acid secretion in the highest output hr. (30-90 min.) was 31.6 mEq/hr. in these; 22.6 mEq/hr. in those not fluoroscopically placed. The decrease in gastric juice was statistically significant, and fluoroscopic positioning is considered necessary. Fourteen controls were 'positioned'. Whereas the highest mean level of secretion in the control group occurred at 60-120 min., that in the duodenal ulcer patient at 30-90 min, after stimulation. Mean differen in rates was significant at 0-60 min., slightly so at 30-90 min. and not at all at 60-120 min. Fluoroscopic positioning was performed in 3 wit gastric ulcer, 9 with gastric resection, 18 wit pernicious anemia. Ulcer patients had a normal secretory pattern; the 9 resections had av. outputs below control values; all 18 with pernicious anemia were achlorhydric with a gast juice pH of 6.9 or higher. Side reactions included tachycardia, headache, weakness and mild flushing. Large amounts of blood were recovere in the stomach of 14 subjects after drug admin. In 3 (54, 77, 82 yr.) vasomotor collapse occurred 30 min. after admin. of betazole, but all responded to s.c. admin. of 0.5 ml epinephrine (1:1000).

6698 DETERMINATION OF THE DOSE OF HISTAMIN CAUSING MAXIMAL GASTRIC ACID SECRETIO IN THE PYLORUS-LIGATED RAT. (E.) Thompson, J. (UCLA Sch. Med., Los Angeles, Calif.) and Y. H. Lee. Amer. J. Dig. Dis. 12(5):449-455, 1967.

Rats were weighed after a 24-hr. fast. Under ether, an upper abdominal incision was made, the pylorus ligated, gastric lavage was perform with introduction and immediate withdrawal of 4 ml of warm normal saline. Rats were used between early and midmorning on the day of stud After recovery from ether, rats were randomly divided into 10 groups and histamine (1 mg base/2.76 mg) was admin. s.c. in doses of 0 (controls), 3.125, 6.25, 12.5, 25.0, 25.0, 35.3 50.0, 70.7, 100, and 200 mg/kg. Rats received no antihistamine. Controls received s.c. inj. of normal saline. Neither death nor histamine intoxication was observed during experiments. Two hr. after ligation, rats were rapidly anesthetized and the stomach removed after

sophageal ligation. All were macroscopically
ormal. Stomachs were trimmed of mesentery,
ashed, blotted dry. The greater curvature was
ncised, gastric juice collected. After centri-
ugation (5000 g for 10 min.), the vol. of
upernatant and solids was measured. After selec-
ion, each group contained 10-12 rats. Total
cidity of the sample was measured by titration
ith NaOH. Acid output (μEq/kg/2 hr.) at the
bove histamine doses was: 70, 85, 80, 90, 180,
15, 290, 190, 170, 150. The peak response (290
Eq/kg/2 hr. at 50 mg/kg histamine) was highly
ignificant. Gastric secretory vol. and total
cidity varied linearly. Gastric juice vol.
aralleled acid output. There was a significant
ifference between control values for gastric
uice vol. and gastric juice vol./100 g on the
ne hand, and these values after 50 mg/kg hista-
ine. Doses of histamine larger than the peak
0 mg/kg) depressed both acid output and gastric
uice vol. It is concluded that histamine is a
owerful stimulant of rat gastric acid secretion
nd that max. acid secretion occurs in pylorus-
gated rats with histamine at 50 mg/kg.

99 EFFECTS OF *IN VITRO* NEUTRALIZATION ON
THE COMPOSITION OF THE NONDIALYZABLE
OMPONENTS OF HUMAN GASTRIC JUICE. (E.) Welsh,
D. (U. Oklahoma Med. Ctr., Oklahoma City),
D. Wallace, A. Walker and L. Russell. *Amer.*
Dig. Dis. 12(4):389-395, 1967.

astric content was collected from 32 fasting
atients through a nasogastric tube with continuous
uction for 30 min. following inj. of histamine
).04 mg/kg) and chlorpheniramine (15 mg). Each
ollection was divided into 2 equal vol. One sample
as neutralized with 0.1 *N* NaOH to pH 7.0 The
amples were separately dialyzed in cellophane
ags against 9 changes of distilled water for 3
ays in the cold, following which they were
yophilized. Wt., hexose and nitrogen content,
roteolytic enzyme activity and B_{12}-binding
apacity were determined. When the paired samples
ere compared, *in vitro* neutralization and dialysis
educed the conc. of the proteolytic enzyme activity
nd increased the conc. of hexoses and B_{12}-binding
aterials. *In vitro* neutralization and dialysis
educed the wt. of the samples and the total
roteolytic enzyme activity while the total B12-
inding material was increased. Nitrogen conc.
as reduced. One patient received a continuous
istamine infusion (0.7 mg/hr.) for 7 hr.; secre-
ions were collected half-hourly. The samples
ere divided and 1 sample neutralized. In each
)-min collection the nitrogen content of the
eutralized sample was less and the other values
ere similar to the 32 individual cases. It is
oncluded that experiments utilizing neutralization
nd dialysis of gastric juice must be interpreted
ith caution when the results are being related
o secretion.

00 THE EFFECTS OF SECRETIN, PANCREOZYMIN,
AND GASTRIN ON INSULIN AND GLUCAGON
SECRETION IN ANESTHETIZED DOGS. (E.) Unger, R. H. (U. Texas Southwest. Med. Sch., Dallas), H. Ketterer, J. Dupré and A. M. Eisentraut. *J. Clin. Invest.* 46(4):630-645, 1967.

Anesthetized mongrel dogs were prepared for study by placement of an indwelling needle in the pancreaticoduodenal vein in the direction of venous flow. The femoral vein and femoral artery were catheterized. A catheter was inserted into a mesenteric vein and saline infused intraportally (2 ml/min.), throughout the experiment. Blood samples were obtained before and after intraportal inj. or infusion of secretin, pancreozymin-cholecystokinin, and of a crude gastrin-containing extract of hog antrum. All these preparations increased the insulin conc. in the pancreaticoduodenal plasma, with a peak effect occurring 1 min. after inj. Only pancreozymin raised pancreaticoduodenal venous glucagon, reaching a peak 3 min. after inj.; hyperglycemia occurred soon after. Intraportal infusion of secretin and pancreozymin for 20 min. produced qualitatively similar, but sustained, effects. The beta-cytotropic effect of secretin was abolished by infusion of epinephrine. These results could not be attributed to contamination of the preparations. It is concluded that secretin, pancreozymin and, probably, gastrin have insulin-releasing activity; pancreozymin, in addition, has glucagon-releasing activity. These findings suggest that there is a chain of beta-cytotropic hormones in the gastrointestinal tract capable of augmenting insulin secretion as required for disposal of substrate loads, preventing high substrate conc. that would otherwise follow ingestion of large meals if the insular response were entirely a function of arterial substrate conc.

6701 STUDIES ON ANTIBODY TO INTRINSIC FACTOR. (E.) Schade, S. G. (U. Wisconsin, Madison), J. Abels and R. F. Schilling. *J. Clin. Invest.* 46(4):615-620, 1967.

Sera from a group of 79 patients with pernicious anemia were studied for the presence of antibody to intrinsic factor. Three different tests were used: charcoal absorption technic, electrophoretic retention test, and coprecipitation tests. Two general types of antibody activity were found, and it was possible to distinguish 3 groups of pernicious anemia sera on the basis of their content of these types. Type I antibody blocked the binding of radioactive B_{12} to intrinsic factor when added to intrinsic factor before the B_{12}; it was not detected on intrinsic factor when added after B_{12}. This antibody blocked intrinsic factor-mediated B_{12} absorption *in vivo* when mixed in the sequence, intrinsic factor + antibody I + B_{12}. Type II antibody reacted with intrinsic factor when B_{12} was attached. This antibody prevented absorption of B_{12} from intrinsic factor in pernicious anemia patients when mixed in the sequence, intrinsic factor + B_{12} + antibody II, and was thereby distinguished from antibody I.

6702 THE PANCREATIC SECRETORY RESPONSE TO TOPICAL ANESTHETIC BLOCK OF THE SMALL BOWEL. (E.) Slayback, J. B. (Loma Linda Sch. Med., Calif.), E. M. Swena, J. E. Thomas and L. L. Smith. Surgery 61(4):591-595, 1967.

Adult mongrel dogs were prepared for study by placing a Thomas fistula into the duodenum opposite the major pancreatic duct, the accessory duct being ligated. A Thiry-Vella loop (20 cm) was made and a second Thomas fistula placed in the most dependent part of the stomach. During study, a glass cannula was inserted into the main pancreatic duct to allow collection of secretions, and the Thiry-Vella loop perfused by means of a Foley catheter, placed in the proximal end of the loop. HCl (20 ml of 0.075 N) was inj. into the loop followed by a 30-min. perfusion of the same soln. at a rate of 1.5 ml/min. The intestinal loop was then perfused with 0.4% oxethazaine soln. for 60 min. followed by restimulation with HCl. Collections of pancreatic juice were made throughout. The same protocol was followed using 5% Bactoprotone soln. instead of HCl soln. Topical anesthesia with oxethazaine followed by HCl stimulation caused an 86% decrease in pancreatic secretory vol., 93% reduction in amylase output, and a 94.5% decrease in lipase. Oxethazaine followed by Bactoprotone stimulation decreased secretors vol. 75%, amylase output 91% and lipase output 91%. The authors conclude that these findings are consistent with the presence of a local neural mechanism controlling the release of secretin and pancreozymin from the small intestine.

6703 RESPONSE OF THE ISOLATED DOGFISH GASTRIC MUCOSA TO HISTAMINE. (E.) Hogben, C. A. M. (Mount Desert Island Biol. Lab., Salisbury Cove, Maine). Proc. Soc. Exp. Biol. Med. 124(3):890-893, 1967.

Dogfish were caught and immediately used for experiment. The gastric mucosa was separated as a flat sheet and mounted in a plastic chamber, allowing both surfaces to be bathed with appropriate soln. The isolated gastric mucosa spontaneously secreted acid at a slow rate of 1-2 µEq cm^{-2}/hr.$^{-1}$. Histamine (200 µM) and carbachol (10 µM) increased secretory rates by 100-150%. The highest conc. of porcine gastrin used, 0.05 µM, did not elicit a marked response although this conc. was found to be adequate for isolated bullfrog mucosa. Peak secretory response occurred approx. 120 min. after the addition of a drug. The histamine content of the gastric mucosa of 2 dogfish was found to be 2.5 and 8.7 µg/g, similar to values reported for bullfrog mucosa. It is suggested that the relative insensitivity of the dogfish mucosa to hog gastrin can be explained by the relative insensitivity to extracellular histamine, but it is more likely due to species differentiation of the polypeptide gastrin, assuming that a gastrin hormone is liberated by the antrum of the elasmobranch.

6704 THE EFFECT OF PROLONGED WITHDRAWAL OF ENDOGENOUS STIMULI TO GASTRIC SECRETI (E.) Little, J. M. (Western Infirm., Glasgow, Scotland), S. P. Master, B. S. Bedi and I. E. Gillespie. Brit. J. Surg. 54(3):225-228, 1967.

Four dogs received a histologically-confirmed antrectomy with gastrointestinal continuity restored by a gastroduodenostomy. A small Heidenhain pouch was made and a gastric fistula cannula inserted into the most dependent part of the main gastric remnant. Measurement from the pouch should reflect effects of removing both vagal and gastrin backgrounds; measurement from fistula, removal of gastrin background alone, since vagal supply of main gastric remnant was intact. Responses of pouches to standard meat meal were determined after 1 mo. Duplicate histamine and gastrin dose-response curves were plotted from fistula and pouch, using continuous i.v. infusion. Histamine was used in doses of 0.5-16 mg/hr., gastrin (a synt ic pentapeptide gastrin-like substance I.C.I. 50,123) in doses of 0.5-8 µg/hr. Responses to methacholine (1 mg/hr.) were also plotted. Pouch and fistula secretions were collected continuously and acid output was determined eve 15 min. by measurement of vol. and of conc. by titration with NaOH. Tests were repeated after 4 mo. Two of the 4 showed no measurable acid response to the meal in either the early or lat tests. Acid responses were small (0-0.153, 0-0.039 mEq/hr.) in the other 2. When acid secretion did occur, it began after 2 hr. and probably represented the intestinal phase of gastric stimulation. In 3 dogs the main stomac remnant showed an overall reduction in height of curve; in the fourth a shift to the right and reduction in peak response. Av. peak response was reduced by approx. 30%, but the reduction was not statistically significant. Pouch changes were slight in 2, moderate in 2. Pooled curves showed a moderate overall reducti of the same magnitude as above, also not signif cant. With artificial gastrin, both fistulae and pouches showed a pronounced reduction in individual and pooled curves. Av. reduction wa 80% and was significant. With combined infusio of gastrin (8 µg/hr.) and methacholine (1 mg/hr the main stomach response was the same as with gastrin alone. Fistulae were constant with methacholine, pouches showing consistent and significant reductions in secretion. The resul suggest a biochemical disuse atrophy rather tha cellular atrophy.

6705 EXOCRINE PANCREAS ADAPTATION TO DIET IN VAGOTOMIZED RATS. (E.) Morisset, J. (U. Sherbrooke, Quebec, Canada) and J. Dunni Rev. Canad. Biol. 26(1):11-16, 1967.

When 200 g male Wistar rats were fed a high-protein diet, a decrease in amylase content and an increase in proteolytic enzyme content of their pancreas was observed. On a carbohydrate rich diet just the opposite was found. Adaptat

enzyme synthesis was not prevented by vagotomy,
pancreas of vagotomized rats exhibited higher
zyme activities than those of normals. Results
reported on amylase and chymotrypsin, and on
corporation of orotic-6-^{14}C acid into pancreas
, during fasting and at intervals after a meal.
zyme content was consistently higher in
gotomized rats than in normals. In the vagoto-
ed rats, beginning of active extrusion of
zyme material from the pancreas after the meal
delayed about 2 hr., but the quantity ex-
ted and the duration of excretion and of zymogen
ck reconstitution were the same in vagotomized
normal rats. In the normals, rate of RNA
rnover increases when extrusion of pancreatic
yme material begins and returns to baseline
n zymogen stocks are replenished.

6 EFFECT OF BILATERAL ADRENALECTOMY ON
GASTRIC ACID AND PEPSIN SECRETION FROM
TRIC FISTULAS AND HEIDENHAIN POUCHES IN DOGS.
) Cooke, A. R. (VA Ctr., Los Angeles, Calif.),
L. Nahrwold and M. I. Grossman. Gastroenterology
3):488-493, 1967.

ally-innervated gastric fistulae were con-
ucted in 2 dogs; gastric fistulae and vagally-
ervated Heidenhain pouches in 2 others; dogs
ted for 3 wk. Dogs were fasted for 18 hr.
ore tests and a hind leg vein was catheterized
permit i.v. infusion of 0.15 M NaCl by
istaltic pump (29 ml/hr.). Gastric juice was
lected from fistulae and pouch for two 15-min.
iods to obtain basal secretion levels. Gastrin
histamine was then added to saline, with
e doubled every hr. Gastrin juice was collected
ry 15 min., and vol. and conc. were measured,
was pepsin activity. After control studies
h dog was adrenalectomized and maintained on
l (4 g daily) and deoxycorticosterone acetate
5 mg i.m. every other day), and hydration was
ntained. Studies began on the third day.
er this regimen, the Heidenhain pouch animals
eived an i.v. infusion of hydrocortisone
0 mg) immediately, received 25 mg hydro-
tisone i.m. every day after this and were
tudied. One dog with fistula was tested for
effect of a continuous infusion of a high
e of histamine (6 mg/hr.) on blood pressure.
max. acid output in response to histamine
gastrin was not significantly different.
max. acid output with gastrin after
enalectomy was 49% and 42% of control values,
h histamine 39% and 49%. In control studies,
. acid output in response to histamine equaled
trin from fistula dog but was greater than
trin from the Heidenhain pouch dogs. After
enalectomy, the value from the fistula
mals decreased in response to histamine and
trin, but only to histamine from the pouch
s while that from the pouch dogs due to
trin stimulation was unaffected. Decrease in
retion in both preparations appeared by day
nd was well established by day 10, remaining
stant at a reduced value. There was no differ-
e in time course between dogs with both
preparations. After adrenalectomy, pepsin output was not significantly different from controls. Hydrocortisone restored acid secretion to normals. Normal dogs tolerated the highest histamine dose; adrenalectomized dogs collapsed due to severe hypotension.

6707 HYPERSECRETION OF GASTRIC ACID FOLLOWING PORTACAVAL SHUNT IN THE DOG. (CONTINUATION AND CONCLUSION.) (Fr.) Hubens, A. (U. Brussels, Belgium). Acta Gastroent. Belg. 30(1):7-55, 1967.

Following creation of portacaval shunt in dogs bearing Heidenhain pouches and weighing 15-20 kg at the start of the experiment, the 24-hr. secretion of gastric acid reached 3.5-7.0 times the initial level, with 3 of 4 animals showing a significant increase in the amount of free acid present while fasting. Postprandial acid response was also increased significantly. Acid response to s.c. inj. of submax. doses of histamine was 2.4-3.7 times preshunt levels; to s.c. inj. of 20 μg gastrin or 1 mg bethanechol chloride, it was 2.5-3.7 and 2.6-4.0 times preshunt levels, resp. However, the increase of acid response to histamine, when inj. s.c. into a hind paw, was only 19-45% as great as the response to inj. into a front paw, a phenomenon not paralleled in studies with gastrin or bethanechol chloride. It is suggested that these phenomena, like others reported previously, could be explained by a postshunt increase of the number of parietal cells, by an increase of the serum level of a hypothetical intestinal hormone with gastric acid secretory activity, or by an increase of cholinergic activity in the peripheral circulation in response to hypothetical substances capable of being absorbed or elaborated by the intestinal mucosa.

6708 THE INFLUENCE OF GASTRIC SECRETAGOGUE SUBSTANCES ON CARBONIC ANHYDRASE. (Fr.) Dobrescu, D. (Inst. Med. Pharm., Bucharest, Rumania). Arch. Int. Pharmacodyn. 166(1):167-171, 1967.

When 1.5×10^{-9} M of insulin, 10^{-5} M of reserpine or 10^{-4} M of bethanechol chloride were added in vitro to a rat stomach homogenate, carbonic anhydrase production was activated. The activation seen was less than that produced by the addition of 10^{-4} M of histamine under the same experimental conditions. When 10^{-6} M of acetazolamide was added in addition to these gastric secretagogue substances, the activation of carbonic anhydrase was totally inhibited. Although it is possible that this release of carbonic anhydrase produced by insulin, reserpine and bethanechol chloride could be due to a direct action on stomach cells, it is probably due to the release of histamine caused by these substances. The in vivo corresponding conc. in the rat of these 3 gastric secretagogues would be 1.6 U/kg of insulin, 6 mg/kg of reserpine and 18.2 mg/kg of bethanechol chloride. These in vitro responses were measured by electrometric recordings of pH changes.

6709 CONTRIBUTION TO THE STUDY OF ACID HYPERSECRETION OF THE STOMACH AFTER PORTACAVAL TRANSPOSITION IN THE DOG (CONTINUED). PERSONAL EXPERIENCES.

(Fr.) Hubens, A. (Free U. Brussels, Belgium). Acta Gastroent. Belg. 29(12):1110-1164, 1966.

The effects of portacaval transposition were studied in dogs with Heidenhain pouches, the Thiry-Vella preparation or vagal isolation. Local anesthesia of the intestinal mucosa (xylocaine in 2% epinephrine soln.), before application of the stimulus, markedly inhibited gastric secretion; vagal anesthesia almost completely abolished the secretory response of the Heidenhain pouch to chemical stimulation of the isolated intestinal segment in dogs with portacaval transposition. Under these conditions, parenteral atropine or i.v. secretin also inhibited the secretory response. The acid secretory response in Heidenhain pouches in dogs with portacaval transposition was not enhanced during irrigation of the intestinal segment with 10% N HCl in the presence of aminoguanidine. It is concluded that portacaval transposition reinforces the intestinal phase of gastric acid secretion, probably as a result of mediation by a histamine-like factor, and that liberation of this factor may be controlled by the vagus nerve.

6710 GASTRIC SECRETION AND ELECTROLYTE EQUILIBRIUM. (SERUM AND URINE SODIUM AND POTASSIUM.)

(It.) Maselli-Campagna, G. (U. Bari, Italy), V. Ronzini, S. Ferrarese and V. Giampetruzzi. Gazz. Int. Med. Chir. 72(1): 24-36, 1967.

A total of 25 fasting ulcer patients (18 men, 7 women; aged 27-73 yr.; 22 of 25 with duodenal ulcers, 3 of 25 with ulceration at the site of previous anastomosis) received pyrilamine (Neoantergan; 2.5 mg/kg, route not specified) 30 min. prior to admin. of 0.04 mg/kg histamine phosphate, s.c. Max. histamine response was accompanied by a statistically significant diminution of mean serum conc. of K (from 5.0-4.5 mEq/liter) and a definite, but not statistically significant, diminution of mean urinary conc. of K (from 52-45 mEq/liter). A similar effect was not exerted on either serum or urinary conc. of Na, nor was there any significant relationship between the total urinary excretion of Na and the total amount of acid found in the gastric juice. It is concluded that the reduction of serum conc. of K represented an effect of the antihistamine and a failure of the organism to compensate adequately for the loss of K which it induced in the gastric juice.

6711 ACTION OF ATROPINE UPON THE STIMULATED GASTRIC SECRETION OF THE RAT.

(Ger.) Lick, R. F. (U. Munich, Germany), W. Brückner, O. Beck and W. Hart. Med. Klin. 62(11):414-417, 1967.

A total of 200 female rats (200-220 g) were used in groups of 10; the pylorus was ligated (Shay preparation) preserving as far as possible the local blood circulation. Gastric juice was collected for a period of 6 hr. In addition to measurement of the vol. of basal secretion, the vol. secreted under stimulation of histamine, prostigmine, insulin, tetrapeptide and gastrin was determined without and with the admin. of atropine. Each sample of gastric juice was analyzed for HCl in mEq/hr. and for the number o U/hr. of pepsin by the usual methods. The basal secretion was not significantly depressed by atropine; despite a small decrease in secretion vol., the conc. of the secreted acid was increased. The stimulating effects of prostigmine insulin, tetrapeptide and gastrin were inhibited significantly by atropine, tending to approach the basal values, with prostigmine-atropine secretion falling below the basal atropine value for vol., acid, and pepsin. Histamine-atropine secretion, however, decreased about 33% in vol. and pepsin conc. only 6% in HCl conc. as compare to secretion stimulated by histamine alone. Thi suggests that action of histamine upon the parietal cells cannot be blocked by atropine. The treatment of acidity in ulcer cases by nontoxic doses of atropine is ineffectual and not warranted in clinical practice.

6712 THE SECRETORY FUNCTION OF THE STOMACH FOLLOWING INJECTION OF HISTAMINE, GASTRIN AND SYNTHETIC TETRAPEPTIDE INTO THE SYSTEMIC CIRCULATION AND INTO THE PORTAL VEIN. (SECRETORY STUDIES ON THE HEIDENHAIN POUCH).

(Ger.) Lick, R. F. (U. Munich, Germany), K. H. Welsch, W. Hart, W. Brückner, D. Balser and T. Gurtner. Z. Gastroent. 5(1):7-12, 1967.

Three dogs with vagotomized gastric (Heidenhain) pouches were provided with intraportal catheter via a mesenteric vein; the catheters were brough out of the peritoneal cavity and passed into the intrascapular region by s.c. tunneling, brought through the integument and anchored. After determination of the basal secretion (vol., mEq H and U of pepsin, all per hr.), the same paramete were measured with infusion of 3 different gast stimulants in 45 ml of 0.9% NaCl each, infused over a period of 1 hr.; each stimulant (histami 0.075 mg/kg; gastrin, 0.5 μg/kg and tetrapeptid 6 U/kg) was infused 3 times in succession into each animal, first by the intracaval route (via the femoral vein), second by the intraport route, and third by the intracaval route. In this manner the effect of the passage through the liver was determined. The introduction of histamine into the systemic circulation resulte in the av. increase of 300 times that of the basal secretion, actually to 36 ml, 6.6 mEq. HCl and 6300 U pepsin/hr. By contrast, the infusion of histamine into the portal vein resulted in only an increase of 10 times the

sal secretion to 0.5 ml, 0.30 mEq HCl, and 250 U
psin. The normal liver reduced the effect of
stamine by more than 90%. The comparable tests
ing gastrin gave a consistent, quantitatively
d qualitatively similar, secretion, 20 times
eater than the basal with infusion by either
ute, i.e. there was no hepatic action on gas-
in. Tetrapeptide stimulation was reduced 75% in
ssage of the stimulant through the liver.
fusion over the systemic route caused a 40-fold
crease in secretion, whereas over the portal
ute the increase was only 10-fold.

13 ACTION OF CAFFEINE-CONTAINING AND
CAFFEINE-FREE COFFEE UPON DIGESTIVE
NCTIONS. (X-RAY EXAMINATIONS OF SECRETION AND
TOR ACTIVITY OF STOMACH, INTESTINE AND GALL-
ADDER.) (Ger.) Glatzel, H. (Max Planck Inst.,
rtmund, Germany) and K. Hackenberg. Med. Klin.
(16):625-628, 1967.

group of 10 healthy men, 19-66 yr. old, under-
nt a double-blind test, 6 at a time receiving
eparations 3 and 4 and 4 receiving preparations
and 2. The preparations comprised: 1, 200 ml
caffeine-containing coffee; 2, 200 ml of
ffeine-free coffee; 3, 200 ml of caffeine-contain-
g coffee, 100 g of white bread and 30 g $BaSO_4$
12 g H_2O; 4, 200 ml caffeine-free coffee, 100 g
white bread and 30 g $BaSO_4$ in 12 g H_2O. The
ffee was a standardized brew drunk at a tempera-
re of 50-55°C containing 208 mg caffeine or
5 mg ("caffeine-free"). Although attempts were
de to quantitate the results, they can be
pressed only in general terms. The effect of
fferent pH values upon the amount of caffeine
sorbed by 30 g of $BaSO_4$ was measured *in vitro*;
om pH 3-pH 7.5 the value was fairly constant
an av. of 19%; as almost all the free caffeine
s absorbed in the stomach, only the absorption
the lower acid range was germane. No dif-
rences between the caffeine-free and the caffeine-
ntaining brews (preparations 1 and 2) could
discerned in the stomach with respect to the
rameters studied. When 100 g of white bread was
nsumed (preparations 3 and 4), caffeine-free
ffee produced only a small vol. of gastric
cretion, but a markedly more rapid passage
rough the small intestine than caffeine-contain-
g coffee. Motor activity of the gallbladder
s stimulated more by the caffeine-free brew
an by that containing caffeine. The X-ray
terminations were not sufficiently quantitative
these measurements.

14 EFFECTS OF CHANGES OF BLOOD CALCIUM
LEVEL ON GASTRIC SECRETION. INFLUENCE
THE VAGUS NERVES AND THE ANTRUM. EXPERIMENTAL
D CLINICAL STUDY. (Sp.) Milanese, J. C.
amos Mejia Hosp., Buenos Aires, Argentina) and
J. L. Morel. Rev. Argent. Cir. 11(2):39-41,
66.

2 dogs, a Heidenhain gastric pouch was created
d antrectomy was performed. The effect of

hypercalcemia (induced by admin. of large doses of vitamin D) on gastric secretion was then studied for 9 and 15 wk., resp., prior to sacrifice. The hypercalcemia did not induce a significant increase of gastric secretion or free acid and there was no evidence of gastric hemorrhaging. Studies made of patients, with or without gastroduodenal pathology, who received i.v. perfusions of Ca gluconate soln., yielded similar results. In patients with gastroduodenal disorders who were not operated, the curves of gastric secretion obtained in response to max. histamine stimulation were essentially comparable to those obtained by i.v. perfusion of Ca gluconate, although histamine stimulation resulted in somewhat greater increase of free acid. In patients who had undergone antrectomy and vagotomy for similar disorders, a significant postoperative decrease of total gastric secretion was observed, which was not affected by admin. of histamine, Ca gluconate or insulin.

6715 EXOCRINE PANCREAS FUNCTION AND MODIFIERS OF RESPIRATION. I. ACTION OF MORPHINE, ALONE AND IN COMBINATION WITH SODIUM BICARBONATED WATER, ON PANCREATIC AND BILIARY SECRETION IN THE RAT. (Fr.) Debray, C. (Bichat Hosp., Paris), J. De La Tour, C. Vaille, C. Rozé and M. Souchard. Therapie 22(1):109-117, 1967.

Admin. in rats of 10-20 mg/kg of morphine (i.v.) depressed the respiration within 5 min. to approx. 60% of that initially recorded, but neither the flow of bile nor the excretion of bilirubin was altered. A slight, but insignificant increase in pancreatic secretion followed the morphine inj., as did a slight increase in pancreatic amylase excretion. When Vichy water was admin. (2 doses i.v. of 5 ml.; with an hr. between doses and the last dose being 15 min. prior to the morphine) in conjunction with the morphine, it did not modify the influence of morphine on pancreatic flow, but it did tend to antagonize the effect on amylase excretion. The admin. of the morphine did not modify choleresis in the rat, nor influence the composition of the bile. The fact that these results are in direct contradiction to previous reports on respiratory effectors can partly be explained by species difference in that the rat lacks a pancreatic vesicle, and the doses of morphine differed from previous work.

6716 EXOCRINE PANCREAS FUNCTION AND MODIFIERS OF RESPIRATION. II. ACTION OF CODEINE ALONE AND IN THE PRESENCE OF SODIUM BICARBONATED WATER, ON PANCREATIC AND BILIARY SECRETION IN THE RAT. (Fr.) Debray, C. (Bichat Hosp., Paris), J. De La Tour, C. Vaille, C. Rozé and M. Souchard. Therapie 22(1):119-128, 1967.

Admin. in the rat of 20 mg/kg i.v. of codeine phosphate caused a 15-20% increase in pancreatic secretion which lasted longer than 3 hr., with a slight increase in amylase flow in the pancreatic juices and a 30% increase in bile flow during the first hr. The conc. of bilirubin at first was slightly decreased by the admin. of codeine, but later an increase in conc. was seen as is typical with choleretic drugs. The frequency of respiration was reduced max. to 66% of the initial frequency within the first 5 min. When 2 doses (with an hr. interval) of 5 ml of Vichy water were admin. i.v. to rats, pancreatic secretion was also increased, amylase conc. was increased the third hr., but bile flow was not affected and bilirubin conc. was only slightly increased. When these 2 substances were admin. the increase seen in pancreatic secretion and bilirubin conc. by each did not produce an additive response. Under these conditions, no increase in amylase conc. was seen. The admin. of the Vichy water did antagonize the respiratory suppression caused by codeine.

6717 DISTURBANCES IN ENZYME PRODUCTION IN PANCREATIC DISORDERS.

(Ger.) Heinkel, K. (U. Erlangen-Nuremberg, Germany) and H. Spanknebel. Z. Gastroent. 5(1):26-32, 1967.

Altogether 59 rats were tested for serum amylase conc. following i.p. inj. of 0.3125 mg β-methylazoethylcholine (β choline)/100 g body wt.; 46 were tested after i.p. inj. of 0.2 mg prostigmine/100 g body wt. Tests were also made on 17 rats after ligation of the common bile duct near the duodenum, 13 animals with the ligation near the liver, and 18 rats with ligations at both sites. Finally enzyme disturbances were provoked after 24 hr. in the ligated animals by inj. of β-choline and prostigmine. The effect of sham operations upon blood amylase levels was tested. Amylase activity in the blood was measured by 2 methods (Richeterich's and Heinkel's). These methods gave somewhat different but fairly comparable values for the same blood. Prostigmine did not influence blood amylase conc. in nonligated rats. β-Choline caused an increase in amylase blood level of 3.6 times; the max. level was reached 60 min. after admin. of the drug. A ligature of the bile duct applied close to the liver did not increase the serum amylase level by itself. A ligature applied close to the papilla caused an increase of serum amylase within 2 hr. The application of ligatures at both sites caused less increase than the single ligature applied at the papilla. When the ligature was close to the duodenum prostigmine caused increased serum amylase. Vagal stimulation increased blood amylase most when the pancreatic juice entered the bile ducts. Application of the 2 different ligatures and the combined ligatures 24 hr. prior to β-choline and prostigmine produced the most marked effects; these effects occurred in the same relative order as the effects produced earlier.

6718 ISOAMYLASE CHANGES IN SERUM AND URINE OF WHITE RATS AFTER LIGATURE OF THE COMMON BILE DUCT.

(Ger.) Miholčić, M. (U. Sarajevo, Yugoslavia) and B. Večerek. Clin. Chim. Acta 16(3):383-388, 1967.

Isoamylases of urine and blood and in the extract of kidneys, muscles, liver, spleen, parotid gland and pancreas of white rats were subjected to agar gel electrophoresis for 30 min. The gel was 1.5% agar and 0.2% starch buffered at pH 8.6. Amylase zones in the agar gel were made visible with Lugol's iodine soln. Amylase activity was determined by a photometric method. Urine, serum and the organ extracts were obtaine from white rats; the extracts were made by homogenizing the organs in 1:5 0.9% NaCl. The supernatant, after centrifuging, was used for electrophoresis. After a 30-min. ligation of the common bile duct, a new isoamylase appeared in the blood serum. The isoamylases were separated into 2 general groups: 1 group situated at the cathodic end of the γ-globulins; the other group appeared in the α_2-β_2 globulin range Amylase from blood and urine were in the same fraction lying between the α_2- and β_2-globulins. The extracts of the parotid gland and the pancre occupied a fraction situated more toward the cathode between β_2- and γ-globulins. The nonidentity of serum and pancreatic amylases was shown by their electrophoretic separation from a mixture of the serum and pancreatic extract. Th extracts of liver, spleen, muscles and kidney ea showed 2 fractions, 1 in the region of serum and urine amylase, the other in a more cathodic regi With a refinement of technic these isoamylases c be further separated and identified. After the 30-min. ligation of the common bile duct the new isoamylase of the cathodic group appeared i the serum and also 1 with the same mobility in t urine; these reached their max. after 20-50 hr. disappeared 80-100 hr. after application of liga ture. It is unknown if the liver or the pancrea is the source of this new fraction.

6719 ISOAMYLASES OF HUMAN PAROTID SALIVA.

(E.) Wolf, R. O. (Nat. Inst. Dent. Res., U.S. Publ. Health Serv., Bethesda, Md.) a L. L. Taylor. Nature (London) 213(5081):1128-1129, 1967.

Parotid saliva was bilaterally collected from selected individuals (11) by using modified Carlson and Crittenden cups; 15 μliters of parotid fluid were subjected to electrophoresis at 4 milliamperes/gel for 60 min. at 2-5°C on a 7.5% polyacrylamide gel according to the meth of Ornstein and Davis. The buffer was a 0.025 tris (hydroxymethyl)aminomethane and 0.192 M glycine of pH 8.3. For a comparative study, rat parotid saliva was collected and similarly analyzed. A polymorphism was found in the human saliva; 5 parotid saliva isoamylase bands were found in 3 individuals, 6 in 6, 7 in 1 and 8 in 1 individual. Comparison of human and rat parotid saliva showed differences with respect to the rate of electrophoretic migrati

nd the amylases maintained a high degree of
utonomy when mixed; this suggests amylase
ifferences among genera. Zymogram of the
lectrophoretically-purified amylase illustrated
he resolving power of the polyacrylamide gel
olumn electrophoresis compared with that of paper
trip electrophoresis; where 1 amylase band was
ecovered from paper electrophoresis and then
ubjected to polyacrylamide gel electrophoresis,
bands were found. It is concluded that the
mylase isoenzymes are separated as 1 band during
aper electrophoresis at pH 8.6.

720 THE EXCRETORY FUNCTION OF ONCOCYTES.
CYTOLOGIC, KARYOMETRIC, AND ENZYME
ISTOCHEMICAL STUDIES. (Ger.) Rother, P.
Karl Marx U., Leipzig, Germany). Jahr. Morph.
ikr. Anat. 75(4):400-427, 1966.

ogs (21; 10-17 yr. old) were killed by inj. of
nesthetic, and the fresh tissue was immediately
ixed in a variety of fixatives suitable to the
pecific research. Some tissue was frozen and
ectioned with and without gelatin embedding.
fter sectioning the paraffin-embedded tissue
as stained by a number of different combinations,
ome fluorescent; some sections were impregnated
ith silver. Glycogen was determined in sectioned
issue by a number of methods as was the fat
ontent, saturated and unsaturated, and the
hosphatide esters. Tests were made for a total
f 9 different enzymes. Oncocytes, which are
ells containing oxyphilic granules situated in
he glandular epithelium, are regarded as tumor
ells by some and moribund cells by others.
hese cells were studied for more information
egarding their function. Their differentiation
egins at the base and proceeds toward the apex
ependent upon an intense multiplication of
itochondria. Oncocytes are polarized, which
ecomes evident on silvering, in the distribution
f mitochondria, in the localization of various
ydrolytic enzymes, and as a radiate differentia-
ion in nuclear areas in which ribonucleic acids
re conc. Appearances of apocrine or holocrine
ecretion in these cells of the epithelium have
othing in common with a secretory process.
mitoses may lead to binuclear cells. Oncocytes
how a rhythmic growth of nuclei which form 3
ifferent size classes, their relation being
:2:4. They contain DPN-diaphorase, mono-
mino-oxidase, beta-galactosidase, carbonic
nhydrase, adenosine triphosphatase, and non-
pecific esterases; cholinesterases and alpha-
lucosidase could not be detected; the oncocytes
re innervated cholinergically. Numerous
rguments militate against the interpretation of
ncocytes as degenerate, damaged, aged or dyschylic
ells. It is suggested that these cells serve
n excretory function, probably ionic.

721 CHARACTERISTIC FEATURES OF THE C-TERMINAL
FRAGMENT OF HOG PEPSIN. (E.) Stepanov,
. M. (Inst. Chem. Natur. Products, Moscow), V. I.
Ostoslavskaya, V. F. Krivtzov, G. L. Muratova and E. D. Levin. Biochim. Biophys. Acta 140(1): 182-184, 1967.

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6723 SUCCINYLATION OF PEPSINOGEN. (E.) Gounaris, A. D. (Rockefeller U., New York, N. Y.) and G. E. Perlmann. J. Biol. Chem. 242(11):2739-2745, 1967.

6724 EFFECTS OF DIETARY PROTEIN LEVEL ON GROWTH AND PROTEOLYTIC ACTIVITY OF THE AVIAN PANCREAS. (E.) Imondi, A. R. (U. Maine, Orono) and F. H. Bird. J. Nutr. 91(4): 421-428, 1967.

6725 DISTRIBUTION PATTERN OF THE PANCREATIC AMYLASE AROUND THE GOLGI AREA, DEMONSTRATED BY MEANS OF IMMUNOELECTRON MICROSCOPIC METHOD. (E.) Yasuda, K. (Keio U. Sch. Med., Tokyo), T. Suzuki and K. Takano. Okajima Folia Anat. Jap. 43(2):87-101, 1967.

6726 THE INVOLVEMENT OF THE AMINO-TERMINAL AMINO ACID IN THE ACTIVITY OF PANCREATIC PROTEASES. II. THE EFFECTS OF NITROUS ACID ON TRYPSIN. (E.) Scrimger, S. T. (U. Toronto, Ontario, Canada) and T. Hofmann. J. Biol. Chem. 242(10):2528-2533, 1967.

6727 THE INVOLVEMENT OF THE AMINO-TERMINAL AMINO ACID IN THE ACTIVITY OF PANCREATIC PROTEASES. I. THE EFFECTS OF NITROUS ACID ON ELASTASE. (E.) Gertler, A. (U. Toronto, Ontario, Canada) and T. Hofmann. J. Biol. Chem. 242(10): 2522-2527, 1967.

6728 GASTRIC SECRETION TESTS. (E.)(Rev.) Dragstedt, L. R. (U. Florida, Gainesville). Gastroenterology 52(3):587-589, 1967.

6729 SOME ASPECTS OF GASTRIC SECRETION. (E.)(Rev.) Grossman, M. I. (VA Ctr., Los Angeles, Calif.). Gastroenterology 52(5): 882-892, 1967.

6730 HYPOTHALAMIC CONTROL OF GASTRIC SECRETION. (E.)(Rev.) Smith, G. P. (U. Pennsylvania, Philadelphia) and F. P. Brooks. Gastroenterology 52(4):727-729, 1967.

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6731 GASTRIC SECRETION UNDER MAXIMUM HISTAMINE STIMULATION. CONTRIBUTION TO THE STUDY. (Cz.) Jablonská, M. (Charles U., Prague), L. Stamidis, E. Součková and J. Šnobl. Sborn. Lek. 69(5):142-153, 1967.

6732 HYDROCHLORIC ACID SECRETION BY THE STOMACH. (E.) Kothari, M. L. (Seth G. S. Med. Coll., Bombay), A. B. Vaidya, J. C. Doshi and U. K. Sheth. Indian J. Med. Sci. 21(1): 1-10, 1967.

6733 TUBELESS GASTRIC ANALYSIS. (E.) Pint Correia, J. (Med. Sch., Lisbon), M. Carneiro De Moura and C. Gomes Da Costa. Bri J. Clin. Pract. 21(5):227-231, 1967.

6734 FLUID AND ELECTROLYTE CHANGES ACROSS GASTROINTESTINAL MEMBRANES: ACID FORMATION IN THE STOMACH AND INTESTINAL WATER TRANSPORT. (Ger.)(Rev.) Mertz, D. P. (U. Freiburg i. Br., Germany). Klin. Wschr. 45(2): 57-68, 1967.

See also abstract no.: 7177

735 CHROMATOGRAPHIC ANALYSIS EMPLOYED IN
THE STUDY OF ENZYMATIC PROTEIN
YDROLYSIS IN THE INTESTINAL JUICE FOLLOWING A
ROTEIN MEAL. (It.) Barbara, L. (U. Bologna,
taly), G. L. Stracciari, G. Fontana and P.
zzaroli. Arch. Ital. Mal. Appar. Dig. 33(2):
39-199, 1966.

ollowing introduction of a sound into the first
oop of the jejunum, a normal, fasting subject
eceived a meal consisting of lactalbumin, 1
/kg in 300 ml water plus 1.5 g polyethylglycol.
ne intestinal content was then aspirated at
)-min. intervals during a total observation
ime of 2 hr. Enzymatic degradation of the
otein meal was still incomplete at the end of
ne observation period, as confirmed by the
esence of numerous polypeptides. All the
nino acids were demonstrable at 90 min. and
gain at 120 min. The study is reported
imarily to illustrate the possibility of mak-
g a direct study of digestive processes in the
ntestine.

736 TRYPSIN, CHYMOTRYPSIN, AND TOTAL
PROTEOLYTIC ACTIVITY OF PANCREAS,
NCREATIC JUICE, AND INTESTINAL CONTENTS FROM
E BOVINE. (E.) Gorrill, A. D. L. (Canada
pt. Agric., Fredericton, New Brunswick) and
W. Thomas. Anal. Biochem. 19(2):211-225,
67.

technic was developed to assay total pro-
olytic activity, or esterase activities of
ypsin and chymotrypsin in bovine intestinal
ntents, pancreas and pancreatic juice.
ypsinogen and chymotrypsinogen were released
om pancreatic tissue by homogenization in 0.15
NaCl containing 0.1% Triton X-100. The
mogenate was centrifuged and diluted to con-
in 0.3-1.0% of tissue. Pancreatic juice was
luted in saline to 0.25-0.75 mg protein/ml.
x. enzyme activity and stability were obtained
activating with a crude enteropeptidase soln.
ntaining 0.05 M CaCl$_2$ at 5°C for 2-6 hr. for
ymotrypsinogen and 5-7 days for trypsinogen.
e normal curvilinear response of enzyme conc.
d casein digestion was transformed to a linear
ocess by plotting absorbancy (A) and A 3/2, using
tyrosine standard at 280 mμ. The rate of
nzoyl tyrosine ethyl ester hydrolysis by
tivated pancreatic juice was approx. 2.2 times
eater in 4.7% methanol than in 26%, vol./vol.
ith benzoyl tyrosine ethyl ester dissolved in
% or 56% methanol). The interfering sub-
ances in intestinal contents that produced an
parent esterase activity, in the absence of
zyme substrates, were attributed to increased
rbidity due to Ca complexing with certain
etary constituents or bile salts, or both.
e addition of (NH$_4$)$_2$SO$_4$, CaCl$_2$ and adjustment
intestinal contents to a pH of 8 removed most
the interfering substances from the super-
tant and also augmented chymotrypsin and
ypsin activity in most samples.

6737 THE CARBOXYL-TERMINAL SEQUENCE OF PORCINE PEPSIN. (E.) Dopheide, T. A. A. (Rockefeller U., New York City), S. Moore and W. H. Stein. J. Biol. Chem. 242(8):1833-1837, 1967.

The carboxy terminal sequence of the single polypeptide chain of porcine pepsin has been determined using peptides isolated from tryptic and chymotryptic digests of the pepsin and its aminoethylated and trifluoracetylated derivatives. The 27 residues are: Ile-Leu-Gly-Asp-Val-Phe-Ile-Arg-Gln-Tyr-Tyr-Thr-Val-Phe-Asp-Arg-Ala-Asn-Asn-Lys-Val-Gly-Leu-Ala-Pro-Val-Ala. This terminal segment contains all 3 strongly basic residues in pepsin, 2 Arg and 1 Lys. Since there is no half-cystine residue in this segment, the crosslinking of pepsin by 3 -S-S- bonds occurs within a highly acidic sequence of about 300 residues in which a single His is the only basic residue. The absence of positive charges in this C-terminal sequence contributes to the alkali lability and acid stability of porcine pepsin.

6738 DETERMINATION OF THE LIPID CONTENT OF PLASMA AND PANCREATIC TISSUE AFTER AN EXPERIMENTAL FATTY DIET. SUBMICROSCOPIC AND CHROMATOGRAPHIC INVESTIGATIONS. (It.) Gasbarrini, G. (U. Bologna, Italy), F. Faggioli, L. Gandolfi and L. Frizziero. G. Clin. Med. 47(7):658-674, 1966.

In adult, male albino rats, 6 days of high lipid diet resulted in the deposition of masses of intensely osmiophilic, lipid material in the peripheral and basal cytoplasm of acinic cells of the exocrine pancreas, a phenomenon which was markedly increased after 10 days of such feeding and accompanied by the appearance of similar masses in the interacinic capillaries and in endothelial cells. Gas chromatographic studies of pancreatic tissue homogenates showed no significant differences between experimental and control animals at 6 days, as concerned fatty-acid content. At 10 days, however, the content of oleic acid had risen from 29.8-42.9% in experimental animals, accompanied by a significant decrease of the percentage content of all of the other fatty acids. At 6 days, serum oleic acid content had risen from 20.8-33.5%, in the experimental animals; at 10 days, it was 38.7%. At 6 days, mean values for serum linoleic acid had fallen from 22.7-14.7%; those for serum arichidonic acid, from 13.3-4.6%; at 10 days, these values stood at 15.3% and 4.3%, resp. It is concluded that the passage of lipid material from the blood into exocrine pancreatic tissue was confirmed by this study, not only because the lipid substances demonstrated by the electron microscope had the same morphologic characteristics, but also because of the simultaneous and essentially proportional modifications of lipid content demonstrated by gas chromatography in both tissue and plasma samples.

6739 LOCALIZATION OF THE ACTION OF THE DIGESTIVE ENZYMES IN THE INTESTINE. (E.) Fomina, L. S. (Inst. Nutr., Moscow). Bull. Exp. Biol. Med. 62(9):989-993, 1966. [Transl. Biull. Eksp. Biol. Med. 62(9):28-33, 1966.]

6740 NORMAL INTESTINAL MICROFLORA IN BREAST-FED CHILDREN. (Rus.) Atabekova, K. S. (Andizhan Med. Inst., USSR). Med. Zh. Uzbek. (2):34-37, 1967.

6741 DETERGENT PROPERTIES OF BILE SALTS: CORRELATION WITH PHYSIOLOGICAL FUNCTION. (E.)(Rev.) Hofmann, A. F. (Mayo Clin., Rochester, Minn.) and D. M. Small. Pp. 333-376 in Annual Review of Medicine 18; DeGraff, A.C. (Ed.), Annual Reviews Inc., Palo Alto, 1967, 559 pp.

See also abstract nos.: 7312,7313

42 ACETYLCHOLINE AND CALCIUM ON MEMBRANE
PERMEABILITY AND CONTRACTION OF
TESTINAL SMOOTH MUSCLE. (E.) Hurwitz, L.
anderbilt U., Nashville, Tenn.), S. Von Hagen
d P. D. Joiner. J. Gen. Physiol. 50(5):
57-1172, 1967.

etylcholine elicited a sustained contraction
d increased K efflux in longitudinal muscle
olated from guinea pig ileum. Stepwise
creases in Ca conc. in bathing medium from
06-0.36 mM tended to reduce the increase in
flux, but had a complex effect on mechanical
sponse. Contractions produced by high conc.
acetylcholine increased or remained at a high
lue with increasing Ca conc. Contractions
oduced by low levels of acetylcholine also
proved initially, but were depressed again by
e highest Ca conc. introduced. In the
propriate conc., ethanol completely inhibited
e acetylcholine-induced contraction without
ducing the increase in K efflux. This effect
s reversed by Ca. Both extracellular Ca and
hanol depressed the large, transient increase
muscle tone developed by fibers preincubated
a high-Ca medium and then exposed to a Ca-
ee medium. These results suggest that extra-
llular Ca ions react with 2 different sites in
e membrane, a storage site and a stabilizing
te. A muscle contraction is activated by Ca
ns which diffuse from storage site to the
oplasm. This diffusion process is impeded by
ions reacting with the stabilizing site.
t of the stimulatory effect of acetylcholine
due to its ability to counteract the action
Ca at the stabilizing site.

3 THE INHIBITION OF INDUCED MOTOR
ACTIVITY IN TRANSPLANTED FUNDIC
UCHES. (E.) Brown, J. C. (U. British
lumbia, Vancouver, Canada), L. P. Johnson and
F. Magee. J. Physiol. (London) 188(1):
-52, 1967.

ree dogs with Bickel-type denervated fundic
uches and 6 with transplanted fundic pouches,
with Mann-Bollman duodenal fistulae, were
epared. The motor activity of the pouches was
asured with a low pressure Statham transducer.
ter was used to fill the pouches and the trans-
cer. Duodenal pH was measured by means of a
ss electrode introduced via the fistula. A
ber catheter was also introduced into the
odenum for admin. of various solns. Tris
ffer (30 ml of 0.3 M adjusted to pH 9.0) inj.
o the duodenum was used as a stimulant of
or activity. Cholecystokinin-pancreozymin
U/kg, infused i.v.), 10 ml of emulsified olive
, 30 ml of 0.5% peptone soln. introduced into
duodenum all inhibited Tris-mediated fundic
ch activity. In all cases, frequency of
tractions, percentage activity, and total
litude were reduced. The present experiments
firmed the previous observation that an alkaline duodenum increases the motility of fundic pouches. Since the inhibitory substances studied were active in transplanted pouches it is concluded that the inhibition as well as the stimulation is humoral in nature. Cholecystokinin, pancreozymin or both are suggested as inhibitory hormones.

6744 EFFECT OF VAGAL STIMULATION BY 2-DEOXY-D-GLUCOSE AND INSULIN ON GASTRIC MOTILITY IN DOGS. (E.) Tsukamoto, M. (U. Florida Coll. Med., Gainesville), F. Herrera, D. R. Kemp, G. S. Emås, E. R. Woodward and M. M. Eisenberg. Ann. Surg. 165(4):605-608, 1967.

Vagally-denervated Heidenhain pouches and isolated innervated antral pouches were prepared in 3 dogs, and continuity of the gastrointestinal tract was reestablished with gastroduodenal anastomosis. Tests began 1-3 mo. after recovery. After an 18-hr. fast, motility of pouches was recorded manometrically using a saline-filled balloon in the antrum and an open-tip catheter in the saline-filled Heidenhain pouch. Pressure changes and respiratory movements were recorded continuously. After a 15-20 min. basal recording, insulin (0.5-1.0 U/kg) or 2-deoxy-D-glucose (150 or 200 mg/kg) was admin. i.v. and blood sugar levels measured before and after drug admin. Three experiments with each drug were performed on each dog. At the conclusion of experiments, 1 mg atropine sulfate was inj. i.v., motility measured for 5 min. A motility index (Cooke and Grossman) was used in calculation of response difference to the 2 drugs, and the % change in motility was calculated for each 5-min. period (compared with control) as: % change in motility index = 100 x (motility index after - motility index before)/(motility index before). Insulin consistently and markedly suppressed (beginning at 25-45 sec., continuing 10-20 min.) and then stimulated motility in innervated antral pouches but had no apparent effect on denervated pouch activity. The degree of suppression was dose-related. Atropine blocked stimulation. The effect of 2-deoxy-D-glucose was less consistent than that of insulin, the major effect being stimulation without previous inhibition on innervated antral pouches. In 2 of 9, slight inhibition preceded stimulation. The suppression was of a lesser magnitude and shorter duration than that observed with insulin, and was not dose-related. Atropine blocked the stimulatory phase. This drug also had no effect on Heidenhain pouches.

6745 ELECTROMYOGRAPHY WITH A UNIPOLAR ELECTRODE IN THE HUMAN COLON IN SITU. (Fr.) Couturier, D. (Bichat Hosp., Paris), C. Rozé, M. Couturier-Turpin and C. Debray. C. R. Acad. Sci. (Paris) 264(2)(Ser. D):352-355, 1967.

Electromyography using a unipolar electrode in situ, recorded from the colon of 6 humans, demonstrated the presence of organized electrical activity analogous to that reported in the small intestine. The subjects were examined in the morning prior to eating by introducing the active electrode at the level of the sigmoid colon by means of a rectosigmoidoscope. Recordings were made which lasted, with regularity from 1-5 min. showing slow and regular variations in the potential with amplitude of 0.2-0.4 mV with a remarkably stable frequency of 9-11 cycles/min. The recording of this slow periodic phenomenon indicated that the colon musculature is under the control of one or several "pacemaker" zones. On the electromyograph, the synchronized appearance of larger waves indicated a discharge or depolarization of a group of muscle cells which did not correspond, however, with evidence of a muscular contraction which was discernible by a manometric method, but rather they were very prolonged (in the order of 10 sec.).

6746 EFFECT OF FOCALIZED ELECTROCOAGULATION ON BASIC ELECTRICAL ACTIVITY OF THE SMALL INTESTINE. STUDY IN RATS. (Fr.)

Rougereau, A. (Fac. Med. Pharm., Tours, France), J. Thouvenot and C. David. *C. R. Soc. Biol. (Paris)* 161(10):1923-1925, 1966.

Focalized electrocoagulation of the serous surface of the rat small intestine, involving complete destruction of muscle fibers in an area approx. 0.4 cm^2, 6 cm distant from the pylorus, resulted in creation of a slow-wave pattern resembling that of the pylorus in the region above the area of destruction; in completely anarchic slow-wave patterns in the region below it. Both changes were transient, lasting 5-6 min., with progressive, spontaneous normalization during the 7 min. following. Identical phenomena were observed when the area of destruction was located 18 cm from the pylorus. When it was performed at both sites simultaneously the initial response was an increase in the frequency and a decrease in the amplitude of the slow waves, followed by appearance of massive low-frequency fluctuations, occurring 4-6 times per min., upon which these new slow-wave patterns appeared to be superimposed. When electrocoagulation was performed simultaneously at 3, 6, 9, 12 and 18 cm from the pylorus, normal slow-wave patterns disappeared entirely, being replaced by much slower fluctuations of potential, occurring 4-6 times per min. with amplitudes of the order of 1 mV. Longitudinal stimulation by + 800 mV for 3 min., on the oral side, restored normal slow-wave patterns during the period of stimulation only. It is concluded that the basic electrical rhythm of the rat small intestine is established and/or coordinated at 2 focal points, approx. 6 and 18 cm, resp., from the pylorus, as suggested previously by electrophysiologic studies made during active absorption, and that, at these 2 points, a marked similarity of histochemical characteristics is demonstrable as between muscular and subjacent mucosal tissue, including the presence of SH groups and acidity in the mucus of the latter.

6747 MECHANISM OF VOMITING INDUCED BY APOMORPHINE. (Sp.)

Jiménez-Vargas, J. (Spanish Inst. Physiol. Biochem., Pamplona, Spain), M. Asirón and J. Voltas. *Rev. Esp. Fisiol.* 22(4):173-184, 1966.

In unanesthetized dogs, the ED$_{50}$ of apomorphine required to induce vomiting in the presence of an empty stomach was 12.15 μg/kg; in dogs allowed to ingest milk *ad libitum*, prior to the experiment, it was 12.16 μg/kg; in dogs which had been subjected to mediocolicular decerebration, it was more than 30 μg/kg. Vomiting began with a series of rapid respirations of somewhat greater amplitude than normal, followed by a prolonged (2-5 sec.) contraction of the abdominal wall, with or without simultaneous closure of the glottis. In experiments with an isolated glottis and tracheal cannula, it was established that closure of the glottis did not influence the increase in abdominal pressure mechanically, while studies of the glottis *in situ* confirmed that the moment of max. resistance did not coincide with that of max. abdominal pressure but rather with the act of inspiration. It was also confirmed that closure of the glottis coincided with a relaxation, rather than an intensification, of abdominal pressure. The immediate cause of expulsion of the gastric contents appeared to be an abrupt, simultaneous contraction of the diaphragm and abdominal muscles, occurring rhythmically and bearing a direct relationship to the respiratory rhythm, which tended to accelerate in the presence of gastric distention. When intragastric pressure was increased to 20-40 cm H$_2$O, by introduction of liquid or inflation of a gastric balloon, the amount of apomorphine required to induce vomiting was sharply reduced.

6748 EFFECTS OF GASTRIN AND ITS ANALOGUES ON ISOLATED SMOOTH MUSCLES. (E.)

Mikos, E. (Roy. Coll. Surgeons, London, W.C. 2) and J. R. Vane. *Nature (London)* 214(5083):105-107, 1967.

In a search for a smooth muscle preparation sensitive to gastrin, the response of various muscles to gastrin and its analogs was studied. Using a standard organ bath, the tissues were screened with gastrin II. From the rat, only the descending colon showed sensitivity (2-10 μg/ml); from the hamster, the stomach; from the cat, stomach fundus and descending colon. Rabbit and mouse tissues were not sensitive; pigeon small intestine sometimes contracted, chick rectum did not. Hamster fundus and rat descending colon were studied further with superfusion technics with: human gastrin I, hog gastrin II, and 4 analogs (one an analog of the c-terminal pentapeptide and the other 3, analogs of the c-terminal tetrapeptide).

uiactive molar potencies determined from
periments with the rat descending colon
owed gastrin I, gastrin II, and ICI 50,123 to
equiactive; ICI 51,864 was about half as
tive; ICI 51,251 was 1/40 as active, and ICI
,759 had no activity. On the hamster fundal
rip, ICI 50,123 was about twice as active as
strin I, gastrin II and ICI 51,864. The
lative potencies were similar to their reported
tencies on gastric secretion. In the hamster
ndal strip these effects were unaffected by
opolamine, mepyramine, hexamethonium, nico-
ne, and morphine. In the rat colon, the
tions of all the peptides were decreased or
olished by hexamethonium, scopolamine, and
morphine. It is concluded the action on the
mster fundal strip is direct and the actions
rat colon indirect, probably via preganglionic
olinergic nerves.

49 RELATIONSHIP BETWEEN THE SENSITIVITY
OF THE GUINEA PIG ILEUM TO HISTAMINE
THE VITAMIN C CONTENT OF THE ILEUM. (Cz.)
hdanecká-Soušková, M. (Res. Inst. Exp. Ther.,
ague) and F. Hbubá. Cas. Lek. Cesk. 106(8):
3-216, 1967.

e sensitivity to histamine of the ileum from
inea pigs on Lunde's scorbutigenic diet and
om those on the same diet supplemented with
tamin C (5 mg per day and animal) was compared.
e animals on the vitamin C free diet were
rvested after the appearance of clear
orbutic symptoms (18-22 wk). The contraction
the distal end of the ileum caused by
stamine and its vitamin C content were deter-
ned in parallel. The contractibility was
und to be not related to the vitamin C content
the food or the ileum. This was affected most
kely by other dietary factors. Lunde's diet
pplemented with sufficient amount of vitamin C
recommended for feeding of guinea pigs to be
ed for histamine titration.

0 PASSAGE OF ^{198}Au THROUGH THE SMALL
INTESTINE. (Cz.) Andrysek, O.
arles U., Prague), J. Šetka, P. Georgi, H. J.
z, H. J. Altenbrunn and H. Berndt. Cas. Lek.
k. 106(8):210-213, 1967.

ioactive gold (^{198}Au) was used as a tracer to
ermine how fast the intestinal content passes
ough the intestinal tract of man. From
-500 μc ^{198}Au (about 0.1 mg Au) in 100 ml of
er were admin. p.o. to 25 fasting volunteers
the speed of its passage through the
estinal tract was followed either by photo-
ntigraph or by scintillation camera. The
loidal gold was not adsorbed in the digestive
ct and the av. time in which it reached Bauhin's
ue was within 120 min. after admin. When
Au was admin. together with barium sulfate,
passage of the isotope was slowed down.
plementary experiments in rabbits revealed
t ^{198}Au is not adsorbed to the intestinal wall, but is dispersed in the intestinal content. It is unlikely that the motility of the intestine is affected by the very low dose of radiation absorbed during the experiment. The method described makes it possible to determine the time of passage through the intestinal tract under physiological conditions.

6751 EFFECTS ON GASTROINTESTINAL MOTILITY IN PATIENTS UNDERGOING NLA-II OR CONVENTIONAL ANESTHESIA. (CLINICAL DISCUSSION.) (It.) Calligari, G. (Hosp. of the Brothers and Sisters of Charity, Milan), A. Citro and G. Kunos. Acta Anaesth. (Padova) 16(Suppl. 3): 225-235, 1966.

An experimental group of 9 men and 17 women underwent cholecystectomy or gastric resection under "neuroleptic analgesia" induced by Fentanil (R-4263; Ed.-can not identify this one) + dehydrobenzoperidol (R-4749), while a control group of 12 men, 14 women, underwent similar surgery under conventional pentothal-nitrous oxide anesthesia maintained by continuous drip. Patients' ages ranged from 17-74 yr.; the duration of intervention ranged from 45-150 min. Postoperative nausea was decreased significantly among the experimental group: from 40-0% among males and from 36-13% among females. There was no vomiting in either group, among males; among females in the experimental group it was reduced from 36-13%. No significant differences were observed with respect to regurgitation of gastric juice, intestinal distention, gas pains or resumption of spontaneous defecation.

6752 SUBMAXILLARY GLAND OF MOUSE: PROPERTIES OF A PURIFIED PROTEIN AFFECTING MUSCLE TISSUE IN VITRO. (E.) Attardi, D. G. (Washington U., St. Louis, Mo.), M. J. Schlesinger and S. Schlesinger. Science 156(3779):1253-1255, 1967.

6753 EFFECT OF ACTINOMYCIN D ON SPONTANEOUS ACTIVITY OF THE ILEUM AND ISOLATED ATRIUM OF RABBIT AND ON THE ACTIVITY OF SOME PHARMACOLOGIC AGENTS. (Fr.) Laborit, H. (Boucicaut. Hosp., Paris) and B. Weber. Agressologie 8(2):137-142, 1967.

6754 INHIBITION BY CARDIAC GLYCOSIDES AND AGLYCONES OF THE ISOLATED GUINEA PIG ILEUM: ESTIMATION OF RELATIVE POTENCIES. (E.) Bieltvedt, G. (U. Oslo). Acta Pharmacol. (Kobenhavn) 25(1):80-86, 1967.

6755 INHIBITORY RESPONSES TO TRANSMURAL STIMULATION IN ISOLATED INTESTINAL PREPARATIONS. (E.) Day, M. D. (Brighton Coll. Technol., Sussex, England) and P. R. Warren. J. Pharm. Pharmacol. 19(6):408-410, 1967.

6756 ADRENOCEPTIVE RECEPTORS IN THE DUODENUM, AORTA AND ATRIA OF THE RABBIT. (E.) Hill, A. J. (Dalhousie U., Halifax, Canada) and J. D. Kohli. J. Pharm. Pharmacol. 19(6):350-354, 1967.

6757 SYNTHESIS OF 3-L-LYSINE-BRADYKININ AND ITS O-ACETYL COMPOUND. (E.) Suzuki, K. (Tohoku Coll. Pharm., Japan) and T. Abiko. Chem. Pharm. Bull. (Tokyo) 15(4):536-539, 1967.

6758 THE EFFECTS OF CHOLINE AND ITS ANALOGUES ON THE OUTPUT OF ACETYLCHOLINE FROM THE ISOLATED ILEUM OF THE GUINEA PIG. (E.) Takagi, K. (U. Tokyo), I. Takayanagi, T. Irikura and K. Nishino. Jap. J. Pharmacol. 17(1):115-119, 1967.

6759 ASSESSING THE STRENGTH OF A SPHINCTER. (E.) Cohen, B. R. (Mt. Sinai Hosp., New York, N.Y.). Gastroenterology 52(5): 915-919, 1967.

6760 MECHANISM OF ADAPTATION OF INTEROCEPTIVE REFLEXES FROM MECHANORECEPTORS OF THE SMALL INTESTINE. (Rus.) Gal'perin, Iu. M. (Vladimirskii Moscow Region Clin. Sci. Res. Inst.), N. P. Kochetkova and E. G. Mikhnevich. Biull. Eksp. Biol. Med. 63(4): 11-16, 1967.

6761 ROLE OF THE RETICULAR FORMATION IN REGULATION OF THE INTEROCEPTIVE REFLEX REACTIONS OF THE STOMACH AND SMALL INTESTINE. (E.) Guska, N. I. (Inst. Zool., Kishinev, USSR) Bull. Exp. Biol. Med. 62(8):857-860, 1966. [Transl. Biull. Eksp. Biol. Med. 62(8):14-18, 1966.]

6762 EFFECT OF BILE AND ITS MAIN COMPONENTS ON THE MUSCARINE-LIKE CHOLINERGIC SYSTEMS OF THE SMOOTH MUSCLES. (E.) Ganitkevich, Ia. V. (Ivano-Frankovsk Med. Inst., USSR). Bull. Exp. Biol. Med. 62(9):1024-1026, 1966. [Transl. Biull. Eksp. Biol. Med. 62(9): 66-69, 1966.]

6763 THE PHYSIOLOGY OF INTESTINAL SMOOTH MUSCLE. (E.)(Rev.) Casteels, R. (Physiol. Lab., Leuven, Belgium). Amer. J. Dig. Dis. 12(3):231-236, 1967.

6764 THE PHARMACOLOGY OF INTESTINAL SMOOTH MUSCLE. (E.)(Rev.) Rang, H. P. (U. Oxford, England). Amer. J. Dig. Dis 12(3): 237-244, 1967.

6765 INTRINSIC INTESTINAL REFLEXES. (E.)(Rev.) Kosterlitz, H. W. (U. Aberdeen, Scotland). Amer. J. Dig. Dis. 12(3):245-254, 1967.

6766 SPHINCTER MECHANISMS IN THE GASTROINTESTINAL TRACT. (E.)(Rev.) Edwards, D. A. W. (Cent. Middlesex Hosp., London) Amer. J. Dig. Dis. 12(3):267-276, 1967.

See also abstract nos.: 6713,6912,7040

767 DIFFERENTIAL DIAGNOSIS OF JAUNDICE BY
MEANS OF A NEW HEPATOBILIARY
LEARANCE" TEST EMPLOYING BSP. (Fr.) Pasini,
(Ceccarini Hosp., Riccione, Italy). Acta
stroent. Belg. 30(1):69-72, 1967.

ong 10 patients with jaundice due to obstruc-
on of the biliary passages, the liver function
dex (method of Tura et al.; normal = 96-100%)
nged from 70-96% (9 of 10 below normal
nimum); the cholestatic index ranged from
4-32.4. Comparable tabulations among 10
tients with jaundice due to viral hepatitis
re 60-81% and 4.4-15.0, resp. Among 4
tients with hemolytic jaundice they were
.6-100% (3 of 4 within normal limits) and
2-2.5, resp. In general, the liver function
dex was diminished in the presence of jaundice
e primarily to damage of liver cells and the
olestatic index then varied directly in
oportion to the degree of accompanying
olestasis. In patients with jaundice secondary
obstruction of bile flow, the cholestatic
dex was increased and the liver function index
en varied directly in proportion to the extent
d/or seriousness of accompanying liver damage.
is concluded that determining both indices
multaneously can be a significant aid to
curate differential diagnosis.

68 CONCENTRATIONS OF BILE SALTS AT THE
CRITICAL MICELLAR CONCENTRATION OF
MAN GALLBLADDER BILE. (E.) Tamesue, N. (U.
kansas Med. Ctr., Little Rock) and K. Juniper,
Gastroenterology 52(3):473-479, 1967.

ecimens of bile, not containing blood, were
pirated from gallbladders during surgery of
patients with peptic ulcer (3), carcinoma
tomach, 1; colon 1) and cholelithiasis (1).
ntrifuged sediment of specimens was examined
croscopically for crystal and cellular content
l by paper electrophoresis to verify the
esence of macromolecular micellar components
l detect contamination by serum proteins.
ee specimens were entirely normal; 1 showed
race of serum protein. Fifteen dilutions of
h bile specimen (1/10-1/800) were prepared
h 0.9% NaCl soln. Three surface-tension
surements were made on each dilution within
hr. of collection; density was determined in
yknometer; ultracentrifugation analyses were
e. Chemical analyses included: total bile
ds; cholic acid; dihydroxy bile acids (as
difference between the previous 2);
spholipids; P; cholesterol; bilirubin. Sur-
e tension decreased rapidly and linearly
h increasing bile acid conc. until a point
re the slope changes, the critical micellar
c., occurring when added surfactant molecules
incorporated primarily into micelles and
rt little additional effect on air-water
erface. At higher conc., 1 or 2 additional
lection points were observed. In sedimentation
coefficient curves a dilution eventually was reached at which the sedimentation peaks of the macromolecular component suddenly disappeared. The lowest conc. at which a peak could be identified correlated well with the critical micellar conc. The former was thus considered to be representative of the critical micellar conc. in this system. Ranges were: pH, 7.02-7.59; surface tension, 82-233 dynes/cm; dihydroxy bile acids, 16.0-46.3 mg/ml; cholic acid, 8.6-49.4 mg/ml; total bile acids, 32.0-86.3 mg/ml; phospholipid, 21.5-51.8 mg/ml; cholesterol, 2.6-9.6 mg/ml; bilirubin 1.9-5.4 mg/ml. By ultracentrifugation and surface tension analyses at critical micellar conc., the av. for total bile acid was 1.3 and 1.6 mM/liter, resp.; for dihydroxy bile acids, 0.8 and 0.9 mM/liter; for phospholipid, both were 0.5 mM/liter. The results support the theory that the physicochemical nature of bile is reflected by micellar properties of bile salts. Although total bile salt conc. is reduced in cholelithiasis, it rarely falls below the critical micellar conc. value obtained in this study.

6769 THE EFFECT OF BILE OBSTRUCTION ON THE OXIDATION RATE OF ETHANOL IN THE RAT. (E.) Kiessling, K. H. (St. Goran's Hosp., Stockholm) and L. Pilström. Acta Physiol. Scand. 69(3):187-190, 1967.

One of paired rats had silk ligatures tied around the bile duct; the other received a sham operative placement and removal of a ligature under the bile duct. After 1 wk. the ligated rats showed signs of bile obstruction. One ml of 30% ethanol in physiological saline/100 g was inj. i.p. Beginning 15 min. after inj., 0.1 ml venous blood samples were taken from the tip of the tail every hr. up to 7 hr. The ethanol conc. of blood samples was determined spectrophotometrically with alcohol dehydrogenase and nicotinamide adenine dinucleotide. Ethanol disappeared more rapidly from sham- than from ligated rats. After the max. blood ethanol level had been reached, rates of disappearance were 0.49 and 0.29 mg ethanol/g blood/hr., resp. Max. ethanol conc. was higher in bile-obstructed than in sham-operated rats. It is concluded that the rate of oxidation of ethanol is impaired by bile obstruction. Obstructed rats also needed more time to regain their balance than did sham rats.

6770 CONTRIBUTION TO THE STUDY OF BILE PROTEINS BY ELECTROPHORESIS AND CHROMATOGRAPHY ON SEPHADEX GEL. (Fr.) Lambilliotte, J. P. (Free U., Brussels, Belgium) and M. C. Woussen-Colle. Acta Gastroent. Belg. 30(1):56-68, 1967.

Four distinct protein fractions were separated clearly in normal bile derived by puncture of the gallbladder at the time of surgery for other reasons. The first peak was considerably greater than the others (e.g.: scale value = 2.5), which, in turn, defined a long, "camel's back" curve (e.g.: scale values = 1.5, 2.0 and 1.0, resp.). In bile samples derived through a Kehr drain on the 7th day after surgery for calculi of the gallbladder and common bile duct, only 3 peaks were demonstrable, all occurring at scale values below approx. 0.5 and none appearing to be significantly greater than the others. ~~In samples~~ derived by puncture at the time of surgery for stenosing pancreatic cancer, 2 peaks were demonstrable, neither being predominant; in samples derived by puncture during surgery for acute or chronic cholecystitis and calculi, only a vaguely irregular plateau could be demonstrated. It is concluded that proteins may be filtered through or actually secreted by the mucosa of the gallbladder, and that this capacity may be severely impaired in the presence of pathology affecting this area directly.

6771 RESPONSE OF HEPATIC AND SMALL INTESTINAL BIOSYNTHESIS OF CHOLESTEROL TO NICOTINIC ACID AND ANABOLIC STEROIDS IN RATS.

(E.) Nakamura, K. (Dai' Nippon Pharm. Res. Co. Labs., Osaka, Japan), Y. Masuda and H. Nakamura. J. Atheroscler. Res. 7(2):253-256, 1967.

Male rats (200-220 g, 14-16 wk. old) were treated daily with p.o. doses of 5 and 20 mg/kg methyltestosterone and 7α-ethylthio-17β-hydroxy-17α-methyl-5α-androstano-(3,2-C)pyrazole (PS-179, a new orally active anabolic steroid) for 10 consecutive days, and 40 mg/kg nicotinic acid for 4 days. Ten µc/kg (1-^{14}C)sodium acetate (specific activity 16.4 µc/mM) was admin. i.v. into the tail vein 24 hr. after the last dose of methyltestosterone or PS-179 and 2 hr. after nicotinic acid. To determine peak time of incorporation into liver cholesterol, untreated controls were exsanguinated under ether at 0.25-32 hr. later. Recovery of cholesterol in liver and small intestine was between 92-97%. In fasting rats peak incorporation of ^{14}C into liver cholesterol occurred 1-2 hr. after inj. of ^{14}C, but no constant relationship was observed in non-fasting rats. Subsequently, all rats were fasted for 18 hr. and killed 1.5 hr. after inj. of ^{14}C. Incorporation time of small intestine was 10 times higher than liver, although conc. of cholesterol in both tissues were not significantly different. Action of drugs did not alter tissue cholesterol levels, but all decreased incorporation time of ^{14}C into liver cholesterol and increased it into small intestine cholesterol. Total cholesterol synthesis in liver and small intestine was not significantly altered by these drugs. Simultaneous determination of incorporation time into plasma indicates an apparent increase in PS-179 or methyltestosterone-treated rats, but no change in nicotinic acid rats. It is likely that change in incorporation of 1-^{14}C-acetate into both liver and small intestine cholesterol is unrelated to lowering of plasma cholesterol level with PS-179.

6772 INDUCTION OF HISTAMINE FORMING CAPACITY IN CANINE LIVER BY ENDOTOXIN. (E.)

Fukuda, T. (Chiba U. Sch. Med., Japan). Nature (London) 214(5083):107-108, 1967.

Adrenalectomized dogs were admin. i.v. *Salmonella typhosa* (10 µg/kg), were bled during profound shock and hepatectomized. Liver extract and dialyzed serum preparations were incubated with and without histidine (15 mg) and the histamine content was assayed using atropinized guinea pig intestine. Small, yet significant, histamine-forming activity was found in both the liver and serum preparations (considerably smaller values in the latter) of adrenalectomized animals who showed profound shock, liver engorgement and almost complete glycogen depletion. Only trace activity and absence of activity for liver and serum preparations, resp., were determined employing the same doses of endotoxin in intact dogs. without circulatory shock or liver engorgement and also in those in whom shock was prevented by cortisone treatment or in those made endotoxin-tolerant before the experiment. Shock sera with the larger values of histamine-forming capacity produced marked liver engorgement and depressor response when infused intraportally (40 ml) into normal dogs as compared to sera with a smaller capacity which produced only moderate engorgement with no depressor effect. The "shock-factor" was readily extracted from saline-soaked liver slices and found in the serum protein fraction precipitable by 20-34% saturation with ammonium sulfate. It is probable that the factor is an induced form of histidine decarboxylase.

6773 AN EXPERIMENTAL STUDY OF MICROSCOPIC AND SUBMICROSCOPIC LIPID INCLUSIONS IN HEPATIC CELLS OF THE MOUSE. (E.)

Parks, H. F. (U. Kentucky Med. Ctr., Lexington). Amer. J. Anat. 120(2):253-279, 1967.

A total of 142 young male and female CFW mice were subjected to various dietary regimens. Twelve mice, representing a normal nutritional state, were maintained on Purina laboratory chow until sacrifice; 31 mice were fasted from 1-5 days before hepatic tissue was taken, and 8 others were fasted 4 days and re-fed at 2, 3.5 or 8 hr. before sacrifice. The remaining mice all received special diets; they were usually weaned at 21 days of age, and fed a normal diet for 1 or 2 wk. before being given a special diet. A fat-free test diet containing 58% sucrose as carbohydrate was given to 48 mice for 4-9 days; 17 were fed the fat-free test diet for 6-9 days, and subsequently starved 24-48 hr. before sacrifice. The high-fat diets consisted of 75-90% fat-free test diet and 25-10% fat; 16 mice were fed for 3-8 days on a high-fat diet in which the fat

omponent (25%) was a hydrogenated (and there-
ore saturated) vegetable oil. Ten were fed for
period of 3-5 days on a diet rich in un-
aturated fats (10-25% corn oil). Two
orphologically distinguishable types of
smiophilic inclusions, lipid spherules of
icroscopic (1 μ) and submicroscopic (300-1000 Å)
imensions, were studied by electron microscopy
the livers of mice fed as described above.
issues were fixed by perfusion with osmium and
ost-osmicated at 37°C. Submicroscopic inclu-
ions were present in endoplasmic reticulum,
olgi complex, cytoplasmic vesicles near the
pace of Disse, and in the latter space itself.
e lipid of these inclusions was sufficiently
nsaturated to be fixed and rendered insoluble
postosmication in all mice, except those that
ere fed a diet rich in saturated fat or a fat-
ee high carbohydrate diet (which induces
nthesis of saturated fatty acids); in mice fed
e 2 latter diets, the central mass of the
clusions escaped fixation and was dissolved
ring dehydration and imbedding. Inclusions
ere thus shown to reflect the nature of the
tty acids most freely available in the cyto-
asm of the hepatic cell in a given physiological
ate. The submicroscopic inclusions were
entified as secretion antecedents, elaborated
the liver for export to the blood. The
rger lipid inclusions, which did not dramati-
lly reflect changes in the degree of
turation of fatty acids available in the
ver cell, were thought to represent a more
able storage pool of hepatic-cell neutral
pid.

74 EFFECT OF HEMORRHAGE ON HEPATIC POTASSIUM MOVEMENTS. (E.) Andersen,
(Cook County Hosp., Chicago, Ill.) and W. C.
oemaker. Proc. Soc. Exp. Biol. Med. 124(3):
0-847, 1967.

e immediate effect of a sudden, acute,
derate-sized hemorrhage (approx. 20% of blood
l.) on hepatic and extrahepatic splanchnic
vements of K and Na was studied in 20 experi-
nts on 12 unanesthetized mongrel dogs. Net
tes of hepatic and extrahepatic splanchnic
take or output of the 2 electrolytes were
lculated from arterial, portal and hepatic
asma flow measurements. There was an increase
plasma K conc. in the hepatic vein and portal
in 2 min., and in the splenic artery 3 min.,
ter hemorrhage. A significant increase in net
patic K output occurred in the posthemorrhagic
riod after 3-6 min.; a transient increase in
output of K from the extrahepatic splanchnic
ea was suggested. There were no consistent
anges in Na plasma conc. after hemorrhage;
vever, a transient hepatic uptake of Na in
period after hemorrhage was suggested. A
ansient increase in hepatic plasma flow was
served after hemorrhage. Such changes after
orrhage are similar to changes found after an
. of epinephrine, and it is suggested that
effects of an acute hemorrhage on hepatic K
movements may be the result of epinephrine action.

6775 PLASMA DISAPPEARANCE OF CONJUGATED AND UNCONJUGATED ^{14}C-BILIRUBIN IN THE RAT WITH OBSTRUCTIVE JAUNDICE. (E.) Ali, M. A. M. (Roy. Free Hosp., London) and B. Billing. Proc. Soc. Exp. Biol. Med. 124(2):339-342, 1967.

Three male Sprague-Dawley rats weighing 320, 280 and 300 g, resp., and whose bile ducts had been ligated 7-14 days previously were admin. unconjugated (^{14}C)-bilirubin i.v. at conc. of 0.46 μc, 0.73 μc and 0.77 μc, resp. Plasma disappearance curves of both the conjugated and unconjugated (^{14}C)-bilirubin fractions were determined using a modified Weber and Schalm technic. Over 70% of the (^{14}C)-bilirubin radioactivity in the plasma was present as conjugated (^{14}C)-bilirubin after 15-30 min. of inj. of the unconjugated label. The biological half-life of unconjugated (^{14}C)-bilirubin av. 53 hr. (50-60 hr.) and that of the conjugated form av. 34 hr. (30-38 hr.). This difference was explained by the clearance of conjugated (^{14}C)-bilirubin by the kidney.

6776 INFLUENCE OF DIFFERENT NERVOUS SYSTEM CHARACTERISTICS IN DOGS ON SOME FUNCTIONAL FEATURES OF THEIR BILE SECRETION SYSTEM. (Rus.) Klimov, P. K. (USSR Acad. Sci., Leningrad), V. K. Krasuskii and N. A. Krasuskaia. Zh. Vyssh. Nerv. Deiat. Pavlov. 16(6):1016-1021, 1966.

The process of filling and emptying of gallbladder studied in 18 dogs by i.v. choleography (iodipamide; 0.4 ml of 20% soln./kg) 5-180 min. after admin. of dye and 1-180 min. after ingestion of 50 g of raw egg yolk showed that the rate of filling of the gallbladder by contrast bile and of its contraction after egg yolk feeding depends on the properties of the higher nervous activity, degree of strength and equilibrium of nervous processes. In dogs with weak nervous systems, distribution of contrast bile in the bladder occurred markedly more slowly; gallbladder contraction was also slower and less energetic; excretion of bile was below that in the dogs with a stronger nervous system. In unbalanced dogs the gallbladder filling with contrast bile started relatively rapidly, but then was delayed and the phase of uniform shadow occurred later than in balanced dogs. Gallbladder contraction in unbalanced dogs occurred more slowly than in balanced dogs.

6777 THE EFFECT OF NICOTINIC ACID ON THE DEVELOPMENT OF LIVER REGENERATING ACTIVITY IN RATS WITH PARTIAL HEPATECTOMY. (E.) Šimek, J. (Charles U., Hradec Kralove, Czechoslovakia), A. Husáková, K. Lejsek, J. Kanta and M. Pospisil. Naturwissenschaften 54(10):251-252, 1967.

After partial hepatectomy the normal mobilization of free fatty acids from adipose tissue is repressed by infusion of glucose with or without insulin, accompanied by a depressed rate of hepatic regeneration. The effect of nicotinic acid which exerts a similar action on the mobilization of free fatty acids from adipose tissue was tested on regeneration of hepatic tissue. Wistar rats (220 g) were partially hepatectomized (60-70%). All operated rats were killed 30 hr. later, i.e., at the end of the initial period of mitotic activity. Control rats received no nicotinic acid; experimental rats were inj. with 50 mg/kg nicotinic acid, Group 1 immediately after hepatectomy, and Group 2 12 hr. after hepatectomy. Mitoses/1000 nuclei were: before operation, 0.85; control rats, 15.2; Group 1, 0.0; Group 2, 2.75. Liver (g/100 g body wt.); before operation 1.35; controls, 2.44; Group 1, 1.93; Group 2, 2.12. Total liver content (mg/100 g body wt., RNA): before operation, 10.5; controls, 21.3; Group 1, 13.3; Group 2, 17.9; DNA: before operation, 3.4; controls, 6.3; Group 1, 3.8; Group 2, 4.7. Thus nicotinic acid in the dosage used inj. immediately after hepatectomy exerted a significant, depressing effect upon the parameters measured; nicotinic acid, inj. 12 hr. after pH exerted a less significant effect. Nicotinic acid, which inhibits mobilization of free fatty acids, also inhibits regeneration of liver tissue.

6778 CHOLERETIC ACTIVITY OF P-CHLORPHENYLALKANOLS. (Ger.)

Grisk, A. (Ernst Moritz Arndt U., Greifswald, Germany), K. D. Thiede and B. Galle. Acta Biol. Med. German. 18(1):77-90, 1967.

A series of p-chlorphenylalkanols were investigated for choleretic and associated effects using white rats (180-250 g) fasted 12 hr. before a test. Bile flow was measured from a polyethylene catheter in the common bile duct under anesthesia. The bile fractions, collected in 10- or 20-min. intervals, were weighed and the percentage increase in choleresis calculated; analyses of the bile determined the amount of materials excreted by the liver. The chlorphenylalkanols were dissolved in 75% alcohol and inj. into the duodenum. Every dose was tested on at least 6 animals. In the determination of LD_{50} the undiluted substance was inj. i.p. by means of a microsyringe. The following substances in the bile were quantitatively analyzed: (1) Na and K; (2) bilirubin; (3) bile acids; (4) glucose; (5) glutathione. The action of chlorphenylalkanols on livers poisoned with CCl_4 was tested. The most powerful choleretic effect was shown by p-chlorphenylpropanol, structurally close to 1-phenylpropanol. Chlorphenypropanol was less toxic and twice as active as 1-phenylpropanol. The LD_{50} for chlorphenylpropanol (the most active of the group) was 1100 mg/kg i.p. The dosage range was 25-400 mg/kg; the lowest dosage (25 mg/kg) stimulated choleresis by 80%. The choleretic effect of chlorphenylpropanol was sustained, reaching its peak in 60 min., losing less than half the peak value in the next 60 min. and caused practically no change in the Na and K conc. of bile. Secretion of bile acids remained within the normal range; mg/kg of bile acids in the bile secreted in 90 min. by controls av. 162 ± 17; by chlorphenylpropanol stimulated animals: 146 ± 21. The agent increased bilirubin excretion by 45%. Blood glutathione increased very moderately while the liver glutathione remained normal. Blood glucose was increased by 30% and liver glucose remained normal. The actions remained proportionately about the same in CCl_4-poisoned and normal livers. The clearance of BSP was decreased by chlorphenylpropanol in both normal and CCl_4-poisoned livers. The spasmolytic activity was tested on spasm produced in the guinea pig ileum by acetylcholine, histamine and $BaCl_2$. Effective plasmolysis occurred with conc. from 5×10^{-6} to 5×10^{-8} mol/ml (M.W, 170.64).

6779 THE DETERMINATION OF SERUM BILIRUBIN ACCORDING TO FERRO AND HAM. (Ger.)

Gladtke, E. (Gutenbergstr. 24, Giessen, Germany) Z. Klin. Chem. 5(2):63-64, 1967.

This colorimetric determination of bilirubin depends upon the oxidation of the bilirubin in acid soln. to a blue dye catalyzed by $FeCl_3$. Ferro and Ham combined 3 reagents with $FeCl_3$ into a single reagent in the proportions, 90 g trichloracetic acid, 900 ml isopropanol (to extract the dye); 100 ml ethylenglycolmonomethyl ether (to dissolve lipids) and 1 ml of a 7.2% aqueous soln. of $FeCl_3 \cdot 6\ H_2O$. Ten parts of reagent were mixed with 1 part of serum, the mixture filtered after 5 min., and the dye measured after 30 min. at 660 mμ. The possibility of variable adsorption of dye to precipitated protein and a variation in the amount of dissolved dye with differences in serum protein conc. prompted 2 series of tests: In the first series with 8 mg% bilirubin conc., extinction coefficients of 644 mμ were variable and markedly smaller for preparations with 6 g% than 3 g% protein. In the second series soln. of bilirubin, 4, 8, and 16 mg% in aqueous soln. only, and in 3% and 6% protein were subjected to determination by the Ferro and Ham method and also by the diazo method of Jendrossik and Cleghorn. The extinction coefficients were strictly linear with respect to conc. in the diazo method and were identical for the same bilirubin conc. in water, 2 and 6% protein. The extinction coefficients were disproportionately depressed (by almost 50% in 6% protein) with increased protein conc. in determinations made by the method of Ferro and Ham. The method is not recommended by the authors.

6780 INCREASE OF LIVER WEIGHT AND LIVER GLYCOGEN FOLLOWING INFUSION OF OROTIC

CID AND ADENOSINE. (Ger.) Sickinger, K. (U.
ottingen, Germany), R. Kattermann and H.
annemann. Acta Hepatosplen. (Stuttgart) 14(2):
3-99, 1967.

ats (230-270 g) fasted 12 hr. had a polyethylene atheter passed into the superior vena cava via he left jugular vein; it was impossible for the nimal to remove the catheter through which 2-18 ml were infused/day for 4 days. The rats ere placed in 8 groups of 7-11 animals each. roup 1 received only Ringer's soln. (12 ml/day) hich in this and the other groups contained 5 U of heparin; Group 2 also received 100 mg f choline chloride/day; Groups 3 and 4 eceived in 2 doses of 4 hr./day the sum of 67 g of choline orotate containing 40 mg of orotic cid; 15 mg of adenosine, representing 8 mg of denine, was the daily additive in Group 4; in roup 5 which also served as a control group, 18 of a sorbitol soln. was instilled/day containg 6.6 g of sorbitol; Groups 7 and 8 received he same amount of sorbitol with daily additions Group 6 of 67 mg of choline orotate in the ourse of 2-4 hr.; Group 7 received 200 mg of noline orotate (120 mg orotic acid); Group 8 as instilled with 15 mg of adenosine/day. he animals were bled under anesthesia by heart ncture 96 hr. after the onset of the infusion. ts infused with orotic acid showed a significant rise of 20% of the liver wt. associated th a proportionate rise of the fat-free dry . A further significant increase in liver wt. 3%) occurred with a simultaneous infusion of mg adenosine/day. When sorbitol was infused th a low conc. of orotic acid, the increased y and wet wt. amounted to only 9%; when the ily dosage of orotic acid was raised to 120 a significant liver wt. increase of 18% sued. Addition of 15 mg of adenosine/day used a further increase of liver wt. to 26%; high dose of adenosine produced a more marked se. The liver nitrogen increased to a lesser gree; the material responsible for the creased wt. of the liver, formed or deposited the liver, did not have the nitrogen quisite for protein. Increased liver fat uld not be seen after infusion. In fasting imals orotic acid, especially orotic acid th adenosine, caused a rise of the liver ycogen 7 times as great as that seen in the ntrols. Sorbitol increased liver size.

781 CATHETERIZATION STUDIES ON THE
METABOLISM IN LIVER. (Jap.) Murata,
(Mie Prefect. U. Sch. Med., Tsu, Japan).
ppon Naika Gakkai Zasshi (J. Jap. Soc. Intern.
d.) 55(7):771-788, 1966.

vels of some substances in the blood taken om the hepatic vein, the hepatic wedged vein oth obtained by liver catheterization), the rtal vein and femoral artery were measured in gs after starvation for 14-18 hr. Blood ucose level was generally higher in the order hepatic vein, hepatic wedged vein, femoral artery and portal vein. Occasionally the levels from the hepatic wedged vein were higher than those from the hepatic vein. Although the level of portal vein blood was the lowest in most cases, it was the highest in some dogs, presumably due to gluconeogenesis in the intestine. Lactic acid level was higher in the order of portal vein, femoral artery, hepatic vein and hepatic wedge vein, while no difference was observed in pyruvic acid level among the 4 blood vessels. Serum total protein level was highest in femoral artery blood and was similarly lower in the other three. An inverse relationship was found in serum albumin conc. between portal vein blood and hepatic vein or hepatic wedged vein blood, suggesting the regulatory role of the liver on conc. No significant difference was observed in total cholesterol, phospholipid and neutral fat levels among the 4 blood vessels. Glucose (1 g/kg) was rapidly infused into the mesenteric vein in dogs, and the levels of the above-mentioned substances were determined. After infusion, the difference in blood glucose level between portal vein and hepatic vein or hepatic wedged vein was marked. No definite change was noted after the infusion in lactic acid, pyruvic acid, total cholesterol, phospholipid and neutral fat levels. Slow infusion of the same amount or rapid i.v. inj. of 0.2 mg/kg of glucose induced no significant difference among the blood vessels. Studies were then done in dogs with acute damage of the liver induced by the i.v. inj. of 0.3 ml/kg of CCl_4, 2 times. The dogs were then starved for 14-18 hr., and the levels of the substances were measured. Similar measurements were done also after 7 days of recovery. The blood glucose level was generally low in the dogs treated with toxic agent as compared with the normal level, the level being higher in the order of hepatic vein, portal vein, hepatic wedged vein and femoral artery, while the level was higher in the order of femoral artery, hepatic wedged vein, hepatic vein and portal vein at the recovery stage. No definite difference was observed among the 4 blood vessels in lactic acid, pyruvic acid and total protein levels in the blood at both stages. The protein level in the toxic stage was generally lower than that in the normal case. Cholesterol level was generally higher at the toxic stage and lower at the recovery stage as compared with the normal levels. Neutral fat level was lower at the toxic stage, and then increased; and cholesterol and neutral fat seemed to be liberated from the liver during the toxic stage. The opposite was found in the phospholipid level. Hepatic wedged venous pressure was 175 and 180 mm H_2O during the toxic and recovery stage, resp.

6782 COLLECTION OF MOUSE URINE OR BILE.
(E.) Pope, R. S. (U. Oregon Dent.
Sch., Portland). J. Appl. Physiol. 22(5):
1024-1025, 1967.

A flat-bottom, dome-top 2.5 ml reservoir of Silastic rubber, having a side-mounted length of Silastic tubing (internal diameter 0.025 inch) which can be connected to a cannula, with 0.1 ml dead space vol. of tubing and cannulae, was used. The whole unit can be autoclaved. The reservoir is implanted under anesthesia in a s.c. position in the lumbar region; the tubing is positioned to run ventrally along the s.c. plane, then through the ventral peritoneum; the peritoneum is closed around the tubing by a loose purse-string suture; a cannula is inserted directly into the urinary bladder or common bile duct. After recovery of the animal, fluid can be aspirated from the reservoir by a sterile needle inserted through the skin. Placement of domes was of no hindrance to the mice. Of 20 mice with cannulated bile ducts, 17 survived (av. survival time 22.1 days). Six of 10 survived when reservoir domes were connected to the common bile duct (av. 27.3 days, range 3-64). Six of 7 with cannulation of urinary bladder survived (av. 23 days). For max. urine collection the urethra should be ligated because urine was often lost by the oral route when this was not done. Flow of urine and bile stopped a few days prior to death. Domes should not be emptied completely, but if this is done, a small amount of sterile saline soln. should be inj.

6783 AUTORADIOGRAPHIC AND BIOCHEMICAL STUDIES ON THE DISTRIBUTION OF CARRIER-FREE ^{32}P IN MOUSE LIVER. (Ger.) Halbhuber, K. J. (Friedrich Schiller U., Jena, Germany), K. Thielmann and G. Geyer. Acta Histochem. (Jena) 26(2):301-310, 1967.

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6787 QUANTITATIVE MEASUREMENT OF ALCOHOL DEHYDROGENASE ACTIVITY WITHIN THE LIVER LOBULE OF RATS AFTER PROLONGED ETHANOL INGESTION. (E.) Morrison, G. R. (Washington U. Sch. Med., St. Louis, Mo.) and F. E. Brock. J. Nutr. 92(2):286-292, 1967.

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6794 EFFECT OF UNILATERAL ADRENALECTOMY O THE BEHAVIOR OF HEPATIC DEHYDRASE AN AMINOFERASE ACTIVITY. (It.) Pistacchi, E. (U Pavia, Italy). Minerva Chir. 22(7):415-417, 1967.

6795 EFFECT OF UNILATERAL ADRENALECTOMY O HEPATIC METABOLISM. STUDY OF REGENERATION OF PROTEIN FRACTIONS AND BLOOD LEVELS OF GLUTAMIC-PYRUVIC TRANSAMINASE. (It. Pistacchi, E. (U. Pavia, Italy). Minerva Chir 22(7):417-420, 1967.

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TRANSAMINASE IN THE LIVER OF NEWBORN
LBINO RATS AND ITS ALTERATION AFTER X-IRRADIATION
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967.

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HUMAN LIVER. I. DISTRIBUTION OF ACTIVITY
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6829 STUDIES ON ENZYME CONCENTRATION AND ADAPTATION IN HUMAN LIVER AND ADIPOSE TISSUE. (E.) Shrago, E. (U. Wisconsin Med. Sch., Madison), J. A. Glennon and E. S. Gordon. J. Clin. Endocr. 27(5):679-685, 1967.

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6832 A METHOD OF SYNTHESIS OF ALLOCHOLANOI ACIDS. BILE ACIDS AND STEROIDS 182. (E.) Kallner, A. (Karolinska Inst., Stockholm). Acta Chem. Scand. 21(2):322-328, 1967.

6833 TURNOVER OF CONSTITUENTS OF THE ENDOPLASMIC RETICULUM MEMBRANES OF RAT HEPATOCYTES. (E.) Omura, T. (Rockefeller U., New York, N. Y.), P. Siekevitz and G. E. Palade. J. Biol. Chem. 242(10):2389-2396, 1967.

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6837 THE OOGRAM IN EVALUATING RESPONSE TO TREATMENT IN PATIENTS WITH Schistosoma mansoni. REPORT OF THE EFFECTS OF SODIUM GLUCONATE AND ANTIMONYL. [DOCTORAL THESIS, PRESENTED TO THE DEPARTMENT OF CLINICAL THERAPY, SCHOOL OF MEDICINE, UNIVERSITY OF MINAS GERAIS.] (Por.) Sales Da Cunha, A. (U. Minas Gerais, Brazil). Rev. Ass. Med. Minas Gerais 17(1-4): 94-95, 1966.

A group of patients with schistosomiasis was treated with a combination of sodium gluconate and antimonyl (proportions not indicated; total doses of 20.0-35.6 mg/kg, i.v. over 6-8 days). At the time of report, 20 of 32 had been free of infestation for more than 4 mo., including 10 of 20 who had been under continuing observation for more than 1 yr.; 4 of 32 had experienced reinfestation and were currently receiving a second course of treatment; 8 of 32 failed to respond. It is suggested that higher dose levels might increase the percentage of favorable responses; however, the attempt has not been made in deference to the known toxicity of antimonyl.

6838 INHIBITION OF THE MOTILITY OF Proteus BY ANIONIC SURFACE-ACTIVE AGENTS IN THE DIAGNOSIS OF Salmonella, Shigella AND Escherichia coli ENTERITIS. (Ger.) Linde, K. (Friedrich Schiller U., Jena, Germany), M. Kittlack and G. Funk. Deutsch. Gesundh. 22(6):275-279, 1967.

Enteritis coli organisms were isolated from stool samples of 6.4% of 5260 infants, using the Winkle culture medium; 24% of these organisms were motile Proteus strains. Using a medium containing an anionic surfactant ("detergent indicator plate"), pathogenic coliforms were detected in 8.7% of the samples. The increased yield was statistically significant. Salmonelliform and shigelliform organisms of the typhus-paratyphus groups comprised 0.1% and 1.25% of the organisms, resp. The significantly increased yield of pathogenic bacteria in the detergent indicator medium was confirmed by analysis of 296 samples from known typhus-paratyphus carriers.

6839 RADIOISOTOPE SCANNING OF THE SALIVARY GLANDS. A PRELIMINARY REPORT. (E.) Gates, G. A. (U. Michigan, Ann Arbor) and W. P. Work. Laryngoscope 77(5):861-875, 1967.

A short review of diagnostic technics using radioisotopes is included. Salivary gland scanning has 4 uses: tumor recognition, tumor localization, tumor identification (much clinical experience required), and physiological evaluation. A study is reported on comparative uptake by the dog salivary gland of 3 radionuclides: Na^{131}I, ^{99}Tc-pertechnate, and selenomethionine (methionine with S replaced by ^{75}Se). Agents were inj. i.v. in Nembutal-anesthetized dogs and external measurements of thyroid, parotid and body background radioactivity were made before inj. and at intervals afterwards. Photoscans of lateral and ventral neck-face areas of each dog were made. Direct measurements of blood and tissue radioactivity of 4 other dogs were made. Parotid and submandibular glands were dissected from several dogs to determine normal gland size, wt., and position. Doses of 100, 200, and 500 μc ^{131}I were given to 4 dogs each (total 12). Parotid activity became apparent immediately, reached a max. at 24 hr., and decreased gradually. For 2 hr. after inj., thyroid and carotid counts were nearly equal, but at 24 hr. thyroid counts were 5-10 times greater than parotid. Parotid scan visualization was optimum at 24 hr., although scan size and gland configuration were smaller than anatomically observed. A dose of 500 μc was necessary to obtain the minimum of 2000 cpm required to produce statistically reliable scans. Doses of 200, 500, and 1000 μc pertechnate were admin. to 4 dogs each. Parotid activity was apparent immediately, plateaued at 2-4 hr., and 6 hr. value was equal to that at 1 hr. Corrected for decay, max. uptake was at 6 hr. Up to 2 hr. thyroid counts nearly equaled parotid, but at 6 hr. were one-third of parotid. Scan size and configuration were about equal to that of the actual gland. At each dosage level, scans were excellent. Selenomethionine was admin. (500 μc) to 3 dogs, but no salivary scan visualization was observed in 7 days. Advantages of pertechnate over ^{131}I and selenomethionine for radiosialography are stressed.

6840 CARMINE AS A SOURCE OF NOSOCOMIAL SALMONELLOSIS. (E.) Lang, D. J. (Harvard Med. Sch., Boston, Mass.), L. J. Kunz, A. R. Martin, S. A. Schroeder and L. A. Thomson. New Eng. J. Med. 276(15):829-832, 1967.

An epidemic of Salmonella cubana infection in an urban New England hospital was traced to carmine dye. It was found that S. cubana was not a rare serotype and laboratory technics were largely to blame for lack of recognition. Over a 16-mo. period 21 cases of infection were recognized. Most patients showed symptoms of gastroenteritis, some with fever, while several had only mild symptoms. Twelve of the nosocomially acquired infections appeared shortly after ingestion of 0.3 mg capsules of carmine powder used as a stool marker. Several other nosocomial outbreaks were reported simultaneously in other regions. Heating of carmine during commercial production was found to be inadequate to kill the bacteria. Insects from Central America, which are the source of the dye, seem to be the source of contamination. Carmine is also used in the coloring of drugs, food and cosmetics. It was found that ingestion of as few as 15,000 S. cubana organisms (there were 30,000/capsule)

be sufficient to begin significant and even
al infection, especially during impaired
istance, such as probably would be the case
a situation where fecal study was required.

41

THE INFLUENCE OF THERAPEUTIC DOSES OF CIBA 32644-Ba ON THE HEMATOPOIESIS OF
TIENTS WITH AMEBIASIS OR SCHISTOSOMIASIS.

.) Doyen, A. (U. Lovanium, Leopoldville,
go Republic), J. Léonard, S. Mbendi and J.
net. *Acta Trop*. (*Basel*) 24(1):59-77, 1967.

myelotoxic effects were encountered in 25
ients (of the Negroid race from the area of
shasa in the Congo) suffering from either
biasis or schistosomiasis who received 25-30
kg/day in 3 daily doses for 10 consecutive
s of nitrothiamidazole (CIBA32644-Ba).
ther a decrease in reticulocyte production
an increase in the clearance of plasma Fe
noted, regardless of the severity of the
dition, nor was a tendency towards medullary
oplasia noted. The values for granulocytes,
throblasts and megakaryocytes remained
phologically and quantitatively normal. How-
r, in 5 cases where a deficiency of glucose-6-
sphate dehydrogenase was noted in the red
ls, the compound seemed to provoke a
dency towards hemolysis, but this phenomenon
eared benign in most instances and did not
uire any change in treatment. In 7 cases,
chiatric disorders occurred which required
mination of treatment in 4 cases on the
enth day. The 22 patients with schistosomiasis
with *Schistosoma mansoni* and 2 with *S. hema-*
bium) ceased eliminating eggs 10-20 days after
treatment (5 of these have remained con-
lled 2-4 mo. later). Two patients with
bic abscesses improved rapidly with treatment
did one patient with severe amebic colitis.

42

INTESTINAL ANASTOMOSIS WITH N-BUTYL CYANOACRYLATE TISSUE ADHESIVE. (E.)

sumoto, T. (Walter Reed Army Inst. Res.,
shington, D. C.), R. M. Hardaway III, K. C.
i, F. Leonard, C. A. Heisterkamp III and
M. Margetis. *Surgery* 61(4):567-572, 1967.

ılt mongrel dogs (70) of both sexes were
vided into 7 groups according to anastomosis
ocedure and tissue adhesive as follows:
oup 1: invagination, adhesive, holding sutures
) dogs); A. proximal segment into distal
gment (37 dogs); 1) N-butyl cyanoacrylate
ingle application)-30 dogs, 2) amyl cyano-
rylate (single application)-2 dogs; 3) heptyl
anoacrylate (single application)-2 dogs; and
N-butyl-cyanoacrylate (repeated applications)-
dogs.; Group 2: invagination, adhesive only
dogs): 1) N-butyl cyanoacrylate-3 dogs, 2)
tyl cyanoacrylate-2 dogs; Group 3: submucosa
erting, adhesive, hold sutures-5 dogs; Group
submucosa everting, adhesive only-5 dogs;
oup 5: serosa inverting; adhesive, hold sutures-5 dogs; Group 6: serosa inverting, adhesive only-5 dogs, and Group 7: serosa inverting, suture only (conventional technic)-5 dogs. Groups 2-6 had the proximal segment into distal segment, and in Groups 3-6, n-butyl cyanoacrylate was used. All 30 dogs in which single application of n-butyl cyanoacrylate was used survived. Various degrees of adhesion of the anastomosis to the intestine and omentum were seen at the area of anastomosis, but no kinking or obstruction occurred. The mucosa was united without evidence of luminal narrowing. There was a lesser degree of acute inflammation and residual polymer at the twelfth wk. as compared to the fourth wk. There was smooth union of the submucosa and each layer. In Group 2, 2 dogs in which heptyl cyanoacrylate monomer was used died 2 and 4 days after surgery. Two dogs in Group 3, 3 dogs in Group 4, 3 dogs in Group 5 and all in Group 6 died between 48 hr. and 14 days postoperatively. All in Group 7 survived. All dogs that died had anastomotic breakdown with signs of hemorrhage except 2 in which amyl or heptyl cyanoacrylate monomer was used. The av. time for the invagination anastomosis with use of cyanoacrylate tissue adhesive and 4 holding sutures was 7 min., as compared to 15 min. for conventional intestinal anastomosis. Application of tissue adhesives in intestinal anastomosis is dependent on the development of less toxic monomers and the development of a suitable technic; the method of intestinal anastomosis using a minimal number of sutures and a minimal amount of tissue adhesive provided a small collar of reasonable anatomical overlapping and maintained functional activity of the intestine. N-Butyl cyanoacrylate monomer, but not the other cyanoacrylate monomers, was satisfactory.

6843

THE EPINEPHRINE EFFECT IN ANGIOGRAPHY OF GASTROINTESTINAL TRACT TUMORS.

(E.) Kahn, P. C. (Tufts U. Sch. Med., Boston, Mass.), W. J. Frates and R. E. Paul, Jr. *Radiology* 88(4):686-690, 1967.

Arteriography of the celiac or mesenteric arteries or their branches preceded by admin. of epinephrine (5-30 µg depending on vessel size) was conducted for diagnostic purposes in 100 patients with known or suspected tumor of the gastrointestinal tract. Better tumor visualization was achieved in 23 of 50 patients using this technic. Contrast media was inj. usually within 3 sec. after epinephrine admin. Epinephrine resulted in a uniform decrease in blood flow in the hepatic and splenic trunks to 1 ml/sec. and 2 ml/sec., resp. Spleen length decreased approx. by 6%. Epinephrine response in gastric and pancreatic arteries was rapid and variable while the colonic arteries constricted more than those of the small intestine. Vessels of the gallbladder and pancreas were often unresponsive. Vasoconstriction generally remained marked for about 15 sec. and then diminished, resulting in a period of manifest hyperemia. No patient discomfort was associated with epinephrine inj. Vessels leading to a tumor were less responsive than normal arteries to epinephrine, which proved helpful in diagnosing primary liver tumors and vascular metastases to the liver. When arteries to a tumor provided only an inflammatory condition, epinephrine resulted in a "false negative" response. Variable response to epinephrine was manifested by pancreatic tumors, while some success was observed in carcinoma of the colon. Little success was noted in use of epinephrine in cases of gastric carcinoma. Use of this technic demands complete familiarity with the normal range of epinephrine effect in the gastrointestinal tract before application.

6844 INTESTINAL LYMPHANGIOGRAPHY IN VIVO. (E.) Nusbaum, M. (U. Pennsylvania, Philadelphia), S. Baum, B. Rajatapiti and W. S. Blakemore. J. Cardiov. Surg. 8(1):62-68, 1967.

An in vivo operative method for direct visualization of lymphatic drainage of the gastrointestinal tract of the mongrel dog is described. Evans Blue dye (0.5 ml) is inj. into the subserosal layer of the antimesenteric border of the intestinal segment under observation. A lymphatic channel conveying dye in the terminal arcade of the mesentery is dissected, isolated, and cannulated with a 25-30 gauge needle. Warm Ethiodol is inj. (3-5 ml at 1 ml/5 min.) as a contrast and the lymphatic vessel is seen to dilate. Progress of contrast during inj. is followed by fluoroscopic monitor. Inj. is discontinued when regional nodes or thoracic duct are opacified. X-rays are taken at completion of inj. and after 24 hr. Certain problems of extention to clinical use are suggested. The method requires an operative procedure and must be done at the time of associated laparotomy. The procedure may require 20-30 min. for cannulation and inj. of contrast medium. Media may be used as an adjunct to the operation in patients where the delineation of a block resection for carcinoma of the gastrointestinal tract might be of value as well as the study of certain obscure inflammatory diseases of the intestine, regional enteritis, and ulcerative colitis. Preliminary studies in patients at laparotomy confirm the feasibility of this procedure in the demonstration of lymphatic drainage of the gastrointestinal tract in man. Although unsuccessful to date, this method suggests the possibility of visualizing intestinal lymphatics by X-ray preoperatively following ingestion and absorption of iodized oil in the small intestine.

6845 ORAL GASTROINTESTINAL DIAGNOSIS WITH BARIUM SULFATE--AMIDOTRIZOATE COMBINATION. (Ger.) Glaser, F. H. (Martin Luther U., Halle-Wittenberg, Germany) and H. L. Kölling. Radiol. Diagn. (Berlin) 8(1):13-21, 1967.

The advantages and disadvantages of $BaSO_4$ suspensions and iodine-containing soluble contrast materials are outlined. A shortening of the time required for a complete X-ray examination of the gastrointestinal tract to 3 hr. while still retaining the contrast afforded by $BaSO_4$ is possible through use of a mixture of 185 ml of Esobaryte suspension (a suspension of very fine particles of $BaSO_4$ especially prepared for esophageal studies) and 16 ml of a preparation of amidotrizoate (Visotrast 370) compounded to correct its bitte taste. This combination was the result of numerous trials with Esobaryte, Laktobaryte, and the usual $BaSO_4$ suspensions mixed in different proportions with the amidotrizoate compound containing 325 mg of iodine/ml. The combination fulfilled the following requirement (1) In the region of the esophagus, the stomach and the duodenum, the degree of diagnostic certainty should be at least as great as with pure suspensions of $BaSO_4$. (2) The small intestine must be particularly well differentiated in structure and function. (3) The delineation of the proximal colon should be better than with pure $BaSO_4$. The examination of the entire gastrointestinal tract should be completed regularly 3 hr. after the intake of the contrast medium.

6846 CLINICAL EXPERIENCES WITH A STRICTLY FAT-FREE DIET SUPPLEMENTED WITH MEDIUM CHAIN TRIGLYCERIDES (MCT). (Dan.) Jarnum, S. (State Hosp., Copenhagen), H. Jense G. Bendixen and K. Bro-Jørgensen. Ugeskr. Laeg 129(22):718-722, 1967.

Medium chain triglycerides (6-12 carbon atoms) have been found useful in malabsorption where t pancreatic and biliary secretions are sufficien A fat-free diet supplemented by medium chain triglyceride has proven advantageous in 5 cases of protein-losing enteropathy; 15 patients with secondary malabsorption problems were also treated with medium chain triglycerid Of the 15 patients, 4 had undergone resection of the small intestine, 3 had pancreatic insufficiency, 3 unoperated terminal ileitis, 2 gastrectomy syndromes, and 3 had other less usual forms of malabsorption: retroperitoneal fibrosis with chylous ascites, intestinal sarcoidosis, and dermal and gastrointestinal mastocytosis. After a pretreatment period of 8 days on a normal diet containing 70-100 g of fat/day, the patients received a daily diet containing no more than 7 g of fat supplemented with 50-70 g medium chain triglycerides. The diet was adequate in terms of calories, proteins and vitamins, although the intake of linoleic, linolenic and arachidonic acids was low. The therapy was evaluated by fecal fat determinatio increase of wt. and clinical examination. The patients with protein loss had routine serum protein analyses. Albumin metabolism and intestinal loss of albumin were investigated using radioactive human albumin. All patients with protein-losing enteropathy showed improvement; in 4 of 5, wt. increased from 3-9 kg;

al fat in these 4 who formerly had
atorrhea (fat av. 17%) became normal (fat 6%);
thout steatorrhea showed no wt. gain. Serum
umin conc. increased; during the time of
atment intestinal loss of protein markedly
reased in 3 and completely stopped in 2 cases
was proved by loss of fecal radioactivity.
except 2 of the other 15 patients showed wt.
ns of 2-7 kg; 13 of these had steatorrhea
ore treatment; after treatment daily fecal
was 0-10 g in 12 cases (av 4.2 g/day); the 3
er patients had 61, 28, and 26 g of fecal
/day. Two patients with terminal ileitis did
improve with treatment; 2 with pancreatic
ufficiency did not improve until the treat-
: was supplemented with pancreatin.

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AMYLASE ACTIVITY. (Ger.) Steger, W.
Clin. Erlangen-Nuremberg, Germany) and K.
nkel. Z. Gastroent. 5(1):37-41, 1967.

liminary studies on a number of preparations
waxy corn starch, almost 100% amylopectin,
luded some which required cooking and some
treated which could be mixed directly in cold
er, and a phosphate-esterified starch
ecial Starch 3828), easily dispersed in cold
er, and, when cooked, clear, homogeneous and
tral with persistent, high thickening qualities.
perature and age had less effect upon Special
rch 3828 than upon the others. It was chosen
the determination of urinary amylase conc.
terms of viscosity, measured in a rotation
cosimeter which indicated viscosity on a
le in 100 U. A number of trials with this
rch and pancreatin as powder and as soln.
wed 50 ml of 4% starch preparation to be the
t substrate vol. and conc. at 352 rpm of the
cosimeter at 37°C. When 2 ml of urine were
ed to 50 ml of 4% Special Starch at 352 rpm
at 37°C, viscosity fell linearly 11 U in 3
. The physical measurement of amylase
ivity can be done rapidly; the results in
ting urine samples are reproducible. Starch-
er preparations exhibit non-Newtonian
cosity, i.e. viscosity increases with the
ed of stirring. It is therefore imperative
t the speed be constant in these tests. No
relation is made between viscosity measure-
ts and U of amylase in the urine.

8 THE ACTION OF PANCREATIC EXTRACT UPON
STEATORRHEA IN LIVER CIRRHOSIS AND
ER SUBTOTAL GASTRECTOMY. (Ger.) Földes, J.
rst Med. Clin., Budapest), I. Magyar, J.
cs and G. Gyertyánffy. Z. Gastroent. 4(5):
-288, 1966.

est with ^{131}I-labeled triolein was made on
mal persons, on patients with chronic
creatitis or liver cirrhosis, and on patients
h subtotal gastrectomy and Billroth II
structions. The fasting test cases were
en 20 μc ^{131}I-triolein mixed with milk p.o.
The 72-hr. stool collection was measured for radioactivity expressed as a percentage of the ^{131}I-triolein dosage. Blood samples were taken 2,4,5 and 24 hr. after intake of labeled triolein and their radioactivity determined as percent/liter plasma. To prevent accumulation of ^{131}I in the thyroid, each patient received 5 drops of Plummer's soln. 2 times/day during the test. When steatorrhea occurred, the test was repeated while the patient received 2 tablets of pancreatic extracts (Cotazyme forte) 3 times/day. Of 38 controls, 35 showed less than 4% of the radioactive intake in the stool; 2 had 4-5% and only 1 had more than 5%. Four of 7 patients with chronic pancreatitis, 12 of 31 with liver cirrhosis, and 8 of 20 with subtotal gastrectomy had more than 5% radioactive fat in the feces. The oral intake of pancreatic enzymes reduced or rendered normal the fecal fat content in 5 of 12 cases of steatorrhea among patients with cirrhosis; the other 7 cases remained unchanged; improvement was seen in 6 of 7 patients with gastrectomy and steatorrhea following treatment with pancreatic enzymes; the seventh patient showed an increase of fecal fat. No mention is made of the effect of pancreatic enzyme treatment upon the 4 patients with chronic pancreatitis and steatorrhea. The radioactivity of the plasma correlated well with its decrease in the feces.

6849 CLINICAL STUDIES ON OXOMEMAZINE IN GASTROENTEROLOGY: ANOTHER APPLICATION IN ESOPHAGOGASTRIC PATHOLOGY. (Dut.) De Groote, J., L. Gomand and L. Van De Mierop. T. Gastroent. 9(4):371-378, 1966.

Oxomemazine, a hydrochloride of 9,9 dioxo-10, (2-methyl, 3-dimethyl aminopropyl) phenothiazine is white, crystalline, not hygroscopic, and readily soluble in water at 20°C; when dissolved it should be protected against the light. Its toxicity is similar to that of promethazine; its low toxicity allows its long term use even in pregnancy; it has no effect upon blood pressure and its effect on the CNS and the autonomic nervous system is minimal. It is a good antihistamine and also a contact anesthetic especially suitable for patients who complain of high epigastric pain which presents a diagnostic as well as therapeutic problem. A total of 44 ambulatory patients (23 men and 21 women) were treated with the compound in syrup, the total dose of agent being 15-20 mg/day divided into 3 or 4 smaller doses. Large doses cause depression. The drug was admin. over a period of 18 mo. The 44 patients, examined and diagnosed by clinical tests, radioscopy, and gastroscopy, had a variety of gastric disorders such as atrophy, hypertrophy, erosive gastritis, ulcers, esophagitis (sliding hernia). Forty patients had excellent and continuing relief from pain; 3 had no relief or relief for a short time only; 1 of these 3 had esophagitis and sliding hiatal hernia, 1 had an active ulcer and the third nausea and uremia.

6850 DIAGNOSTIC SIGNIFICANCE OF ABDOMINAL MURMURS. (E.) Julius, S. (U. Michigan Med. Ctr., Ann Arbor) and B. H. Stewart. *New Eng. J. Med.* 276(21):1175-1178, 1967.

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6899 A NEW TREATMENT OF GASTRIC DISEASES BY THE ENZYME ROUTE. (Fr.) Warembourg, H. and G. Ducloux. *Lille Med*. 12(3)(Suppl.):268-270, 1967.

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See also abstract nos.: 6779,6782,7236,7318,7380,7391

GASTROINTESTINAL DISEASES

GENERAL

STUDIES ON SEROTONIN. 3. URINARY
EXCRETION OF 5-HYDROXY-INDOLEACETIC
IN PATIENTS WITH GASTROINTESTINAL DISORDERS.
) Civeira, F. (Fac. Med., Zaragoza, Spain),
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e serotonin is produced by intestinal
ntaffin cells and high serotonin blood
ls occur in the presence of tumors of these
s (carcinoid tumors), the daily urinary
etion of 5-hydroxyindole acetic acid was
ied in patients with lesions of the digestive
t other than carcinoid tumors; this was done
scertain if there were any alterations in the
etion of this substance. The study included
atients with different conditions (glossitis,
tria, ulcer, diarrhea, exocrine pancreatic
fficiency, cholecystitis, cirrhosis, liver
is, portal hypertension and neoplasia). A
l of 419 determinations were performed, and
v. of 6.29 mg/day of 5-hydroxyindole acetic
was obtained, which is a normal-range figure
level in controls ranged from 3-13 mg/day).

EXPERIMENTAL STUDY ON THE CONGENITAL
INTESTINAL ATRESIA. A COMPARATIVE
Y OF THE MESENTERIC VASCULAR OCCLUSION AND
L PERITONITIS AS THE PATHOGENIC FACTOR.
.) Miyake, H. (Kyoto U., Japan). Nippon
Hokan (Arch. Jap. Chir.) 36(2):145-164,
.

ture of intestinal arteries caused necrosis
he small intestine in all adult guinea pigs
4 successive arteries which were supplying
n of the intestinal loop (23.8% of the entire
l intestine) were ligated. Scar formation
noted in the mesenteric membrane with
ture of fewer of the arteries in some animals.
ture of 5 successive secondary branches of
intestinal arteries supplying 16.5 cm of the
(11.5%) also caused necrosis in all animals,
e that of 4 branches supplying 15 cm (10%)
ed necrosis in one-half of the animals.
ases of ligature of successive secondary
ches of the arteries with concurrent block-
of the marginal arteries at each extremity
he intestinal loop, necrosis was induced
3 branches supplying 6.5 cm (4.5%) were
ted. Occlusion of fetal mesenteric arteries
made by ligature with additional cauterization
uinea pigs and dogs near the last fourth of
gestation period. The length of devascular-
intestine was approx. 15 mm in guinea pigs
30 mm in dogs. Only 8 of 51 animals
ated on continued gestation more than 24 hr.
r operation. An autospy of 8 fetuses thus
ined revealed various stages of degeneration
he intestine, such as adhesion, necrosis,
, in approx. proportion to the extent and
tion of intestinal ischemia. In order to
ce experimental fetal peritonitis in guinea
, turpentine oil (0.01-0.5 ml), bile
(0.03-0.05 ml) or stored blood (0.03-0.05 ml) were inj. into the fetal peritoneal cavity through the uterine wall with or without laparotomy of the mother animals. Only 1 of 18 animals continued gestation more than 24 hr. after the inj., although 17 survived. In the fetus which was inj. with the stored blood and kept alive in the uterus for 6 days, a small quantity of reddish-brown, turbid, ascites fluid was observed. Peritoneum and all intestines were stained the same color, but no adhesion was noted. Histological studies revealed mild congestion, edematous swelling of the serosa and infiltration of lymphocytes, neutrophils and monocytes into the submucosa and propria mucosa. These facts suggest a more inductive role of fetal mesenteric devascularization as the cause of congenital intestinal atresia than fetal peritonitis.

6906 BEHAVIOR OF EXCHANGEABLE POTASSIUM AFTER VAGOTOMY. EXPERIMENTAL STUDY. (It.) Lamarca, S. (U. Turin, Italy), F. Balzola, G. Giribone and A. Mussa. Minerva Gastroent. 12(3):83-85, 1966.

Three groups of rabbits, weighing 1.6-2.1 kg, received 60 μc ^{42}K, i.v., single dose, prior to determining the amounts excreted in 12 and 24-hr. urine samples. One group, which consisted of intact animals, served as controls. The drug was admin. to a second group 18 or 72 hr. after ileostomy; to the third group, before 15 or after 65 days after total, bilateral vagotomy. In the animals which bore ileostomies, the potassium peel (mg/kg) was reduced significantly. A significant reduction was also evidenced in the vagotomized animals which were tested within 15 days of intervention, but no significant deviation from control values existed in those which were tested after 65 days. Note is made that the results obtained with animals tested shortly after surgery may have been affected by shock and/or the effects of anesthesia.

6907 THE MODE OF INFILTRATION OF CELLS IN THE DIGESTIVE TRACT AND THE MESENTERIUM IN LEUKEMIA AND RELATED DISEASES. (E.) Honda, M. (Osaka U. Med. Sch., Japan). Med. J. Osaka Univ. 17(2):141-164, 1966.

Subjects were 76 cases of leukemia and other related hematopietic diseases, while controls were 30 cases of other diseases. The most common lesion was macroscopic bleeding in the intestinal mucosa. Ulceration and thickening of the mucosa were also observed. Leukemic infiltrations were most commonly found in the stomach, least often in the duodenum. In leukemia the lymph nodes and radix in the mesentery were larger than those in the peripheral zone. There was no relationship between the type of leukemia and these enlarged lymph nodes. Histologically, of 64 cases of leukemia, 23 had no infiltration of the digestive tract. In those cases with infiltration, the grade of infiltration was lower than that in the mesentery. There was a positive correlation between leukemic infiltration in the digestive tract and the mesentery. Leukemic infiltration of the digestive tract was of a lower grade than that of the mesentery especially with lymphatic leukemia. The existence of many cases of dissociation with the infiltration in the mesentery suggested that leukemic changes of digestive tract and mesentery were not related. It is concluded that there is no association with the systemic theory regarding the development of lymphatic leukemia.

6908 THE ROLE OF VENOUS OBSTRUCTION IN THE FORMATION OF INTRA-ABDOMINAL ADHESIONS: AN EXPERIMENTAL STUDY.

(E.) Belzer, F. O. (Guy's Hosp., London). Brit. J. Surg. 54(3): 189-190, 1967.

In 8 dogs, all the structures in 1 or more of the major arcades were surrounded with a cylinder of ameroid (a hygroscopic casein derivative), and animals were sacrificed 10 days to 3 wk. postoperatively. Massive adhesion was found in all, especially between loops of intestine and also to the surrounding structures such as omentum. At 10 days the adhesions could be separated by blunt dissection, although they were already highly vascularized and serosal surfaces produced a venous ooze. At 3 wk. adhesions were quite dense and could not be dissected free without damage to the serosa. Arterial pulsations were palpable in the arcade distal to the cylinder and arterial bleeding could be demonstrated from both cut ends when the involved arcade was transected distal to the cylinder. In 8 other dogs, 3 or 4 arcades were chosen at equal distances through the small intestine, the lymphatics ligated in 1 arcade, the artery in a second, the vein in a third. Controls received a sham operation of dissection around the base of the arcade, without ligation of lymphatics or vascular supply. At 2-3 wk. there were no adhesions of the intestine supplied by arcades with ligated lymphatics or sham-operated. Adhesions were found at 3 wk. in all vein-ligated arcades. Adhesions varied from none to slight and moderate in cases of arterial ligation. Number and density of adhesions varied directly with number of veins or arteries ligated. In 6 other dogs, 2 or 3 veins, each supplying an arcade, were ligated and intestinal manipulation was minimized. Adhesions were found at exploration at 3-5 wk. It is suggested that small and isolated venous thrombosis in the intestinal arcades might be an important etiological factor in postoperative formation of adhesions in man.

6909 ANEURYSMS OF THE AORTA: A REVIEW.

(E.) Fomons, J. J. (U. Miami Sch. Med., Fla.), F. T. Kurzweg and R. K. Broadaway. Ann. Surg. 165(4):557-563, 1967.

Of 7642 autopsies reviewed, 192 showed 249 (3.2%) aneurysms of the aorta or its major branches. Since none were found in 1495 below 25 yr. (19.5%), and only 3 were discovered in 646 of unknown age, the overall incidence in relationship to autopsies was 4.5%. Incidence was highest for Caucasian men, next for Negro men, but this was reversed for those of the ascending aorta. Locations were: ascending (22.1%); arch (11.6%); descending (7.6%); thoraco-abdominal (2.8%); abdominal (30.9%); iliac (4.8%); dissecting (17.3%); other (2.8%). Major causes of death were rupture, cardiovascu disease, gastrointestinal disease, respiratory disease, neoplasm, trauma, secondary aneurysm. The frequencies in relation to location were: ascending aorta 18.5%, 40.7%, 13.0%, 11.1%, 5.6 7.4%, 3.7%; aortic arch 32.1%; 25.0%, 3.6%, 25.0%, 3.6%, 0%, 3.6%; descending aorta 16.7%, 50.0%, 11.1%, 0% 16.7%, 0%, 5.6%; abdominal aorta 28.4%, 33.8%; 10.8%, 9.5%, 9.5%, 2.7%, 2.7%. In those of the ascending aorta, rupture caused death in 10 of 54 (1 wired for treatment Possibility of death by rupture increased with size of aneurysm: diameter less than 5 cm, 2.3%; 5-10, 11.5%; greater than 10, 44.4%; size unknown 20.0%; total 18.5%. Seven medium-size aneurysms contributed to death (12.9%). The rupture frequencies for those in the aortic arch were 0%, 16.7%, 44.4%, 50%, 32.1%, 32.1%. Combination of those causing and contributing to death was 31.4% in the former, 64.3% in the latter. One of 29 with aortic arch aneurysms was wired unsuccessfully. In 19 of the descending aorta only 3 (15.8%) ruptured. Of 74 of the abdominal aorta, 21 (28.4%) ruptured and caused death, no deaths without rupture. Of 43 dissecting aneurysms, 31 (72.1%) rupture and 3 (7%) caused major vascular occlusion and death. Causes of 3 deaths were unknown, of 6 others unrelated.

6910 MOTOR DIARRHEA FROM MEDULLARY THYROID CANCER. A NEW PATHOLOGIC ENTITY.

(Fr.) Bernier, J. J. (St. Lazare, Paris), M. Bouvry, D. Cattan and A. Prost. Bull. Soc. Me Hop. Paris 117(12):1191-1196, 1966.

Motor diarrhea, wherein the total intestinal transit time was only 3 hr., which had been unresponsive to treatment with either bismuth, lactic bacilli or derivatives of piperidine wa totally eliminated within a few hr. after the ablation of a medullary thyroid cancer. The diarrhea had lasted more than a mo. with only brief remissions and consisted of approx. 7 clear, yellow runny stools every 24 hr. There were no complaints of abdominal pain nor any other evidence of digestive troubles. However anorexia, asthenia and a 10-kg wt. loss (over period of 1 yr.) were noted. During examinati a discrete increase in the vol. of the superio pole of the thyroid was noted, although furthe sts gave no evidence of a hyperthyroid ndition. Scintigraphy revealed a nodule in at area which was removed and determined to be dullary thyroid cancer. The tumor was solid d not anaplastic, showing neither follicular r papillary differentiation (and thus non- creting) and contained high conc. of amyloid ostances in the stroma. Since the diarrhea eared up so rapidly after removal of the mor, it would seem that the tumor was producg a substance which caused hypermotility of e intestine. There has been no recurrence er the following 22 mo., even though thyroxin d to be admin. to compensate for a hypothyroid ate.

11 KIDNEY BIOPSY FINDINGS IN FAMILIAL CHLORIDE DIARRHOEA. (E.) Pasternack, (U. Helsinki, Finland), J. Perheentupa, K. uniala and N. Hallman. Acta Endocr. (Kobenhavn) (1):1-9, 1967.

rcutaneous renal biopsies were obtained with a n-Silvermann needle from 7 children (2 male, female; 1 mo.-3.5 yr. old) with familial Cl arrhea. Typical K-losing nephropathy was served in the 3 youngest children (1, 5 and 5 mo. old at time of biopsy), and nephro- lcinosis was found in all biopsies. Juxta- omerular hyperplasia occurred in all of the ildren. Arteriolar and arterial changes sembling those seen in hypertensive disease re also observed. On the basis of these find- gs, the following pathophysiological sequence suggested for this syndrome. Failure to sorb Cl in the intestine, possibly related to sence of the normal response of the intestinal cosa to aldosterone, leads to depletion of lt and H_2O though the intestine. The children us become hypovolemic, which in turn causes creased activity of the juxtaglomerular paratus as reflected in juxtaglomerular perplasia. An increased release of renin ads to a high blood level of angiotensin which imulates the adrenal cortical secretion of dosterone. This secondary hyperaldosteronism responsible for the observed high urinary K cretion which in turn leads to hypokalemic kalosis.

2 INTESTINAL (DUODENAL) MOTILITY IN RATS WITH CHRONIC CHAGAS' DISEASE. (Por.) nezes, H. (U. Sao Paulo, Brazil) and J. S. ira De Oliveira. Rev. Brasil. Med. 23(11): 9-782, 1966.

ur mo. after i.p. inoculation of approx. 0,000 Y-strain Trypanosoma cruzi, 5-mo.-old bino rats weighing 120 g were sacrificed and isolated segment of duodenum studied for sponse to stimulation by acetylcholine soln., 1-2.0 γ/ml. As compared to duodenal segments rived from normal controls, the test segments owed much increased irritability within the x. response range (0.3-0.5 γ/ml, for both groups), although significant differences were not evidenced at higher conc. levels. In both control and test segments, response was effectively blocked by atropine, 0.4-0.5 γ/ml. In control segments, the mean number of neurons in a 1 mm ring was 2362; in the test segments, it was 933, appearing to confirm a significant reduction in the number of ganglionic cells in Auerbach's plexus in the presence of chronic Chagas' disease.

6913 THE HEART IN PATIENTS WITH "MEGA" CONDITIONS OF THE DIGESTIVE APPARATUS. (Por.) Andrade, Z. A. (U. Bahia, Brazil) and S. G. Andrade. Hospital (Rio) 71(3):719-726, 1967.

Chagas' disease was found in 38 of 1600 pts. autopsied between 1951-1966, an overall incidence of 2.6%. Mega-esophagus was found in 15 of 38; megacolon in 7 of 38; both in 16 of 38 (accompanied by mega-ureter in 1 of 16). Among 13 of 38 (34.2%) dying with clinical symptoms of congestive cardiac insufficiency, macroscopic and microscopic evidences of chronic Chagas' myocarditis were demonstrable. Among those who died in the absence of such clinical symptoms, 16 of 25 showed microscopic evidence of incipient or chronic, interstitial myocarditis and 3 of 9 remaining showed chronic, degenerative changes of the intra-cardiac neural ganglia.

6914 ROENTGENOLOGIC CHANGES IN PROTEIN-LOSING ENTEROPATHY. (E.) Pock-Steen, O. C. (Copenhagen County Hosp., Glastrup, Denmark). Acta Radiol. [Ther.] (Stockholm) 4(6):681-689, 1966.

Ten patients (5 men, 5 women; 18-67 yr. old) with protein-losing enteropathy (Gordon's disease) were subjected to ordinary $BaSO_4$ roentgenologic examinations of the stomach, small intestine and colon. One patient had intermittent dyspepsia, edema and steatorrhea since childhood, whereas the others developed no signs or symptoms until adulthood. No specific features were observed in X-ray study of stomach and colon, but in all except 1 case, significant features were noted in the small intestine. The latter was generally dilated and appeared to fill the entire abdomen; there were broad, biconvex valvulae conniventes and a biconcave mucosal pattern, especially in the jejunum. Peristalsis was less marked. It is suggested that roentgenologic signs were probably caused by edema of the intestinal wall, particularly of the valvulae conniventes, where edema is more marked than in the corresponding grade of hypoproteinemia.

6915 HEREDITARY COPROPORPHYRIA. (E.) Goldberg, A. (U. Glasgow, Scotland), C. Rimington and A. C. Lochhead. Lancet 1(7491): 632-636, 1967.

Ten new cases (5 men, 5 women; 9-75 yr. old) of hereditary coproporphyria are presented, and the 20 other cases from the literature are reviewed. Massive excretion of coproporphyrin III in urine and feces, chiefly the latter, characterizes this disease. Hereditary coproporphyria may be provoked by barbiturates and possibly some tranquillizers and anticonvulsants into acute attacks resembling acute intermittent porphyria; during these an excessive urinary excretion of delta-aminolevulinic acid and porphobilinogen occurs. Analysis of stool porphyrin, supported by chromatographic and countercurrent technics, confirmed this unique biochemical nature of the disease. No clinical symptoms attributable to a porphyrin dyscrasia were found in approx. 50% of the cases; in the remaining 50%, symptoms suggestive of acute intermittent porphyria and, in 1 case, of photosensitivity, were found. The disease occurs in both sexes and at any age, and is hereditary (24 of 30 cases had a family history of the disease) in nature, transmitted usually as a Mendelian dominant trait. Based on hepatic and sternal marrow biopsy in 1 case, evidence was found that the disease is hepatic, not erythropoietic, in type. There was an association of psychiatric symptoms in 4 patients without other clinical symptoms of porphyria, thereby suggesting that a possible diagnosis of porphyria should be considered more frequently in psychiatric practice. The differential diagnosis from porphyria variegata and acute intermittent porphyria is given.

6916 ANIMAL EXPERIMENTS ON THE DECREASED MOTILITY OF THE SMALL INTESTINE IN PERITONITIS.

(Ger.) Lill, H. (U. Vienna). *Wien. Klin. Wschr.* 79(8):140-145, 1967.

Guinea pigs (350-450 g) were used to study the inhibition of peristalsis in experimentally induced peritonitis; a number of substances were tested for the induction of peritonitis; neither suspensions of talcum nor various dilutions of croton oil caused the condition. Hay infusions (0.3 ml/100 g body wt., i.p.), quartz sand (1 g dry) introduced into the peritoneal cavity, and *Klebsiella pneumoniae* (8×10^6 cells/ml, 0.1 ml culture/100 g i.p.) caused varying degrees of peritonitis with edema. Two control groups (saline inj. and uninj.), 1 group treated with hay infusion and 1 with quartz sand were made up of 20 animals each; the *Klebsiella* group had 28 animals. At intervals of 6, 14, 24, and 48 hr. after inj. of peritonitis agents, the animals were killed and the small intestine excised; 3-cm long segments of the lower ileum were taken: 1 for histology and 4 others for recording of muscular contraction under standardized conditions; the effect of 20 different conc. of acetylcholine, the strongest being 25 mg of the substance in 1 ml H_2O was tested on the small intestinal muscle. Although spontaneous motility of the intestine occurred in all experimental animals, the sensitivity to acetylcholine was reduced in peritonitis; however, it was possible to induce 100% contraction by increasing the conc. of the substance. The peristalsis of the small intestine can be initiated by proper medication in all cases of acute peritonitis.

6917 A VASCULAR PERMEABILITY DEFECT IN EXPERIMENTAL CHOLERA.

(E.) Keusch, G. T. (New England Ctr. Hosp., Boston, Mass.), P. Atthasampunna and R. A. Finkelstein. *Proc. Soc. Exp. Biol. Med.* 124(3):822-825, 1967.

Prepared purified choleragen was fed (50 µg) by stomach tube to infant rabbits pretreated by gastric lavage. At intervals (unspecified) aft admin. a single dose of Fe-dextran (1.25 mg/100 body wt.) was inj. i.v. in a vol. of 0.1 ml in femoral vein and the animal was sacrificed 10-6 min. later. Lengths (2-3 cm) of duodenum, prox and mid-jejunum, and ileum were removed, slit lengthwise, and pinned out on paraffin in formalin. After 24 hr. villi were scraped off and fixed to glass slides with Mayers egg album tissue was stained for Fe by Gomori technic and examined by transmitted light. In controls an Fe dose of 2.5 mg/100 g failed to produce observable staining of Fe in villi, even after immediate sacrifice. Gomori-stained sections from controls and treated animals not given the Fe-dextran were negative. Fe was detectable at min. after choleragen, and only 1 of 9 examined at 90-120 min. was negative. This was approx. hr. before initiation of overt cholera diarrhea and fluid was just beginning to accumulate in t intestinal lumen. Fe was localized almost entirely in the venular loop and was observed during the entire cholera syndrome. Of 34 animals sacrificed 2-24 hr. after choleragen, 3 were positive; of the 4 negatives, 3 were sacrificed at 2-2.5 hr. The fourth did not sho diarrhea, although a moderate accumulation of fluid was found within the intestine at 23 hr. Despite the clear contrast between control (12) and cholera animals (50), involvement in the latter was incomplete and not all villi were positive, with staining being spotty and decrea ing in distal specimens. The involvement of al the bowel showed the action of choleragen to be general, and the difference might be due to dilution, proximal binding, or inactivation of choleragen. The concept of cholera as a small intestine disease was supported by the lack of staining of colon vessels. An increase in vascular permeability, delayed in onset and prolonged in duration, was demonstrated. It is suggested that this alteration in permeability a major factor in experimental cholera diarrhea. Human testing is suggested.

6918 OUR EXPERIENCE IN THE SURGICAL TREATMENT OF INGUINAL HERNIA IN THE INFANT.

(It.) Parenzan, L. (Maggiore Hosp., Bergamo, Italy) and C. Galante. *Minerva Pediat.* 19(2): 64-67, 1967.

9 STRANGULATED FEMORAL HERNIA. (E.)
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THE TREATMENT OF RECURRING HERNIA.
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M. Condeescu. Lyon Chir. 63(3):363-366,
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g. Clin., Warsaw). Wiad. Lek. 20(8):741-746,
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OBSTRUCTED INGUINAL HERNIA. (E.)
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Lyon Chir. 63(2):305-319, 1967.

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CONCERNING MIXED TUMORS. (Rum.)
dorescu, L. (2nd Hosp., Iasi, Rumania), G.
dun and E. Stratulat. Otorinolaringologie
cur.) 12(2):97-104, 1967.

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DISEASE. (E.)(Rev.) Lescher, T. C.
yo Clin., Rochester, Minn.), W. H. Hollinshead
W. H. ReMine. Amer. J. Surg. 113(6):743-749,
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(It.) Ferrara, L. (U. Turin, Italy)
F. F. Boltri. Cancro 19(4):303-312, 1966.

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Paulo, Brazil), H. Müller and M. Silveira.
Hosp. S. Casa S. Paulo 12(3-4):61-65,
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OF PAROTID TUMOURS. (E.)(Rev.) Patey,
I. (Middlesex Hosp., London). Practitioner
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OR DUODENUM. (Ger.) Haslinger, R. (Mariahilf
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See also abstract nos.: 6846,7124

93 REFLUX ESOPHAGITIS AS THE CAUSE OF HEARTBURN IN PREGNANCY. (E.)

Paula Castro, L. (U. Minas Gerais, Belo
rizonte, Brazil). Amer. J. Obstet. Gynec.
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total of 88 women from the third-ninth mo. of
egnancy were divided into 2 groups: Group A
nsisted of 73 women who suffered from heart-
rn, and Group B, of 15 women taken as controls
l who never had any symptom of heartburn,
ther during pregnancy or in any other period.
Group A, of 60 patients interviewed, 31
.6%) referred to the beginning of heartburn in
e first trimester of pregnancy, 24 (40%) in
e second trimester and 5 (8.3%) in the last
imester. Of 62 cases studied, 49 (77.2%)
ported that food ingestion induced or
gravated heartburn, and recumbency aggravated
artburn in 82.2% of the cases. In 58 cases of
oup A, 12 were primiparas and 46 multiparas;
(77.9%) of the latter had experienced heart-
rn in preceding pregnancies. Each patient was
mitted to 1-4 tests: the acid perfusion
st, the acid reflux test, esophageal
piration and esophagoscopy. The acid
rfusion test was positive in 98% (49 of 50) of
e Group A patients and negative in Group B
tients; the acid reflux test was positive in
.4% (42 of 44) in Group A and in 13.3% (2 of 15)
Group B. The presence of acid, as revealed
esophageal aspiration, was higher (91%) in
oup A than in Group B (13.3%). Of 42 cases of
oup A studied by esophagoscopy, 40 (93%) had
phagitis, as compared to 1 of 3 in Group B.
stological study of 35 cases in Group A con-
rmed esophagitis in 32 (91.4%). Of 10 cases
om Group A submitted to upper gastrointestinal
diologic series, 7 were normal, and there were
ases of sliding hiatal hernia and 1 case of
stroesophageal reflux. It is concluded that
lux of the gastric contents into the distal
phagus with resultant esophagitis is the most
mon cause of heartburn in pregnancy.

4 THE GASTROESOPHAGEAL JUNCTION IN THE MONKEY AND ITS RELATION TO REFLUX.

) Karas, L. M. (Yale U. Sch. Med., New
ven, Conn.), H. Stern, D. Bloom, H. J. Binder,
Poindexter, W. Thayer and H. M. Spiro. J.
rg. Res. 6(11):469-477, 1966.

adult monkeys (Macaca mulatta) the effect of
rious surgical procedures including elimination
the esophageal sling (Group 1), esopha-
gastrectomy (Group 2), cardiomyotomy (Group 3)
l plication of the gastric fundus to the
dominal wall (Group 4) on the gastroesophageal
incter function is reported with special
phasis on gastroesophageal reflux. Reflux in
s study refers to passage of Ba from the
mach into the esophagus with or without a
vering of the sphincter pressure after
llowing. Postoperative Group 1 monkeys
showed no change in esophageal motility, nor change in the sphincter with respect to its preoperative location and characteristics, nor evidence of reflux with abdominal pressures up to 60 mm Hg. In Group 2 monkeys with subdiaphragmatic anastomosis, continual reflux was observed even in the absence of applied pressure and cleared briefly during periods of peristalsis. In addition, no sphincter was observed and intragastric pressure was transmitted into the stomach. Esophageal waves appeared at the point of respiratory reversal. Monkeys with intrathoracic anastomosis showed essentially the same findings as Group 2 except that esophageal waves were above the point of respiratory reversal. Group 3 monkeys showed the same results as those with intrathoracic anastomosis, except in 2 monkeys in which absence of reflux was consistently demonstrated despite application of abdominal pressure. After fundal plication, 2 normal lower esophageal sphincters were demonstrated. Reflux, which occurred frequently after plication, was diminished after normalization of fundal position.

6995 THE ASSOCIATION OF DIAPHRAGMATIC HIATAL HERNIA AND GASTROESOPHAGEAL CARCINOMA.

(E.) Michel, J. O. (Mayo Clin., Rochester, Minn.), A. M. Olsen and M. B. Dockerty. Surg. Gynec. Obstet. 124(3):583-589, 1967.

A study is reported on an attempt to determine whether or not there exists a cause-and-effect relationship between diaphragmatic hiatal hernia and gastroesophageal malignant disease. Of 398 patients with hiatal hernias observed for a number of yr., only 2 developed carcinomas. Of 163 patients with a primary diagnosis of cardioesophageal carcinoma, 16 had associated hiatal hernias. An earlier diagnosis of hernia was suggested in only 3 of these. In a group of 65 patients with concomitant diagnosis of carcinoma and hernia, it is suggested that in 70% the tumor probably initiated the hernia by shortening the esophagus. Only 6 patients seemed to have long-standing hernias. It is concluded that there is no causal relationship between esophageal hernia and subsequent development of gastroesophageal carcinoma. The incidence of carcinoma of the cardia may be increased when the esophagus is short.

6996 ACHALASIA CARDIAE: RESULTS OF HELLER'S OPERATION. A CLINICAL STUDY OF 55 PATIENTS. (E.)

Helsingen, N., Jr. (State Hosp., Oslo), O. Linaker and O. Kristiansen. Acta Chir. Scand. 133(1):35-39, 1967.

The 29 men and 26 women were 5-82 yr. old, with greatest incidence at 15-60. Diagnosis was by clinical picture, X-ray and esophagoscopy. Previous treatment with hydrostatic or pneumatic bag had been unsuccessful in the 7 attempts.

Operation was a modified Heller procedure: single anterior myotomy on the distal esophagus, with incision carried down beyond cardia onto the anterior gastric wall; laparotomy was performed in 38, thoracotomy in the latter 17. Postoperative clinical complications were infrequent. Supplemental dilatation treatment was necessary in 4 during the first 2 postoperative yr. Three died after operation, one from esophageal perforation at primary procedure; 1 from malnutrition; 1 following a resection of cardia, after several mo., because of esophagitis and stricture. Of 47 studied for 3 yr., 1 was lost to follow-up. The 46 were classified into 3 preoperative radiological states: I, moderate dilatation; II, gross dilatation; III, megaesophagus of sigmoid type. The number of patients who were better, same, or worse on X-ray examination was: I, 8, 2, 0; II, 20, 0, 1; III, 1, 6, 2; total 29, 8, 3. On clinical examination: I, 9, 2, 0; II, 22, 2, 2 (2 postoperative deaths); III, 7, 0, 2 (1 postoperative death); total, 38, 4, 4. More than 80% became asymptomatic or improved markedly after the operation. Reflux, clinical or radiological, was demonstrated in 9 (6 men, 3 women; 14-66 yr.). Hiatus hernia of the sliding type was demonstrated in 3. In these patients the symptoms were moderate and no further treatment was required.

6997 THE SIGNIFICANCE OF VERTEBRAL CHANGES IN THE PATHOGENESIS OF ESOPHAGEAL HIATAL HERNIA.

(It.) Lolli, L. (U. Perugia, Italy) and V. Pasqualucci. Ann. Fac. Med. Perugia 57(1):93-106, 1966.

Marked kyphoscoliotic changes were seen in 3 of 30 patients with hiatal hernia (12 men, 18 women; aged 30-70 yr.); moderate changes of the same kind were seen in 10 of 30; 16 of 30 showed X-ray evidence of arthrosis. It is suggested that kyphoscoliotic deviations of the spinal column, especially those occurring in the lumbodorsal region, may predispose to the development of hiatal hernia.

6998 THE HYDRODYNAMIC CHARACTERISTICS OF THE INTRAMURAL VEINS OF THE GASTROESOPHAGEAL JUNCTION IN THE PRESENCE OF ASCENDING BLOOD FLOW AND THEIR ROLE IN THE FORMATION OF ESOPHAGEAL VARICES.

(Por.) De Carvalho, C. A. F. (U. Sao Paulo, Brazil). Hospital (Rio) 70(6):1541-1561, 1966.

A study was made of 36 adult preparations and 20 derived from 7-9-mo.-old, stillborn infants, following inj. of various contrast media into the left gastric vein, the venae gastricae breves or the portal vein itself, thus simulating various degrees and conditions of portal hypertension resulting in an upward circulation of blood into the mucosal and/or submucosal vessels of the gastroesophageal junction. This study confirmed the presence of an essentially independent, intramural venous system in the inferior segment of the esophagus, of the rete mirabile type, which acted as an effectiv "hydrodynamic barrier" between the portal veno system and that of the superior vena cava. Thi rete mirabile system appeared to be complemente by several "short-circuiting" systems of vesse in the submucosa, pressed against the mucosal muscle sheath, while other vessels appeared to be regulated directly by the muscle sheath itself, through which they passed, and still others clearly represented preferential sites of venous dilatation when blood-flow began to set in a gastroesophageal direction in respons to increased portal venous pressure. It is concluded that the inferior segment of the esophagus, to a height which is not in excess of 4-5 cm above the epithelial transition line in adults, or 1 cm above it in the newborn, represents a functional terminal zone for veno circulation which is moving in an upward direction: i.e., from the portal vein toward the superior vena cava.

6999 NEW TECHNIC FOR VERIFYING THE PRESENCE OF GASTROESOPHAGEAL REFLUX.

(Por.) Pinotti, H. W. (Fac. Med., Sao Paulo, Brazil). Rev. Hosp. Clin. Fac. Med. S. Paulo 21(3):151-154, 1966.

Following insertion of 2 polyvinyl sounds into the stomach, 300 ml HCl (N = 0.1; pH = 1.1) were instilled and 2-3 ml gastric juice aspirated to determine the resulting pH. The sounds were then drawn up to the level of the gastricesophageal junction and 2-3 ml fluid aspirated through the proximal sound at points 1, 3 and 5 cm, resp., above the same. The opening of the distal sound, in turn, was maintained at the level of the inferior esophageal sphincter, in order to study its functioning i relation to esophageal motility. Among 5 norma controls (6 men, 4 women; aged 16-61 yr.) the lowest pH recorded in the esophagus was 5.0. Among 10 patients with retrosternal pyrosis secondary to hiatal hernia, surgery for megaesophagus, gastroesophageal anastomosis or Heller's operation (5 men, 5 women; aged 22-61 yr.), pH values ranged from 1.6-3.66. The only exception was a patient with hiatal hernia whos pH values at 1, 3 and 5 cm were 5.22, 2.56 and 1.95, resp.

7000 INCOMPETENCE OF THE CARDIA AND ITS RELATIONSHIP TO INFLAMMATORY CHANGES OF THE GASTRIC AND OESOPHAGEAL MUCOSA.

(Cz.) Šetka, J. (Charles U., Prague), B. Bednář, V. Potocký and H. Dvořáková. Cas. Lek. Cesk. 106(11-12):296-299, 1967.

The theory that the incompetence of the cardia is caused by decreased motility of the upper portion of the digestive tract was experimental verified. The motility of the digestive tract was impaired by insufflation with 50-60 ml of r of a balloon previously introduced into the omach or duodenum of volunteers. The changes the width of the terminal portion of esophas during swallowing due to the dilatation of omach or duodenum were then recorded by diocinematography. To some of the patients ropine (2 mg) or ephedrine hydrochloride (50) was admin. s.c. 10 min. before examination. e experimental impairment of the motility of e upper part of the digestive tract always led the impairment of the terminal part of the ophagus during swallowing. The admin. of the ugs mentioned above or the stretching of the omach by a large amount of contrasting material aSO_4) did not have a similar effect. In an tempt to determine how often the incompetence the cardia is accompanied by inflammation of e mucosa of the stomach or esophagus, samples gastric and esophageal mucosa were collected multaneously by biopsy from 52 patients with rdioesophageal irritation. Gastritis was tected in 84% of the cases. The incidence of ophagitis was much lower (15% of cases). The nclusion made by other authors that esophagitis incompetence of the cardia always develops om inflammatory changes of the gastric mucosa uld not be confirmed.

01 THE PROBLEM OF SO-CALLED CARDIOSPASM. (Ger.) Blaha, H. (U. Frankfurt/Main, rmany) and K. Reeh. Bruns Beitr. Klin. Chir. 4(2):138-151, 1967.

group of 61 cases of achalasia are reviewed in rms of (1) the condition of the esophageal cosa, (2) esophageal cancer, (3) pulmonary mplications. Despite statements to the ntrary, there is no causal relationship been existing esophagitis (15 cases cited) and e occurrence of achalasia; cardiospasm occurs the presence of a large range of mucosal nditions from the strictly normal to massive filtration of the musculature by leukocytes d thickening of the epithelium. Three of the patients had esophageal carcinoma, and the se of 1 is cited; the carcinoma had caused enosis in the upper-third of the esophagus ich interrupted swallowing. The esophageal rcinoma is often of very rapid growth; the tent of its interference with swallowing ries with location and size. The pulmonary mplications in cardiospasm were severe in ses only in diseased states of long standing d with extreme dilatation. The loss of lung nction caused by fibrosis induced by maintained spiration accompanying cardiospasm is not to underestimated. Every patient with cardioasm should undergo a thorough examination of e respiratory tract.

02 EXPERIMENTAL GRAFTS AS REPLACEMENT OF THE CERVICAL ESOPHAGUS. (Sp.) Corrao, (Italian Hosp., Buenos Aires, Argentina), A. Sivori, E. A. Sivori and T. Pirolo. Rev. gent. Cir. 10(5):209-211, 1966.

In a series of 25 dogs, 3 cm of the cervical esophagus were resected. Continuity of the organ was restored with a segment of bovine aorta in 6 animals, of homologous aorta in 7, with a Dacron tube in 6 and with an isolated, heparinized jejunal loop in 6. With the exception of the last group, results were unfavorable: the other animals died within a short time due to fistula, infection, complete stenosis and rejection or necrosis of the graft. Among the animals receiving a graft of autologous jejunal loop, 2 of 5 died on the second and twenty-eighth days, resp., following dehiscence of the grafted loop. When sacrificed at 2, 4 and 5 mo., resp., the remaining 3 of 5 were all suffering from stenosis of the esophageal anastomosis. In the light of these results and the clinical experience of the authors, it is concluded that the best material to replace a resected esophagus is a gastric section or a colonic or jejunal loop.

7003 TWO OBSERVATIONS OF RARE ESOPHAGEAL MALFORMATIONS: DUPLICATION WITH AND WITHOUT ATRESIA. (Fr.) Bienaymé, J. (Child. Dis. Hosp., Paris). Ann. Chir. Infant. 8(1): 35-43, 1967.

7004 CONGENITAL ANOMALIES OF THE ESOPHAGUS. (Nor.) Knutrud, O. (State Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):799-802, 1967.

7005 A VARIATION IN THE OPERATIVE TECHNIC FOR THE TREATMENT OF ESOPHAGEAL ATRESIA WITH TRACHEO-ESOPHAGEAL FISTULA. (E.) Ty, T. C. (U. Vermont, Burlington), C. Brunet and H. E. Beardmore. J. Pediat. Surg. 2(2): 118-126, 1967.

7006 CARDIOSPASM IN THE YOUNGER AGE GROUP. (E.) Desai, J. R. (B. J. Med. Coll. Civil Hosp., Ahmedabad, India), P. N. Vyas and N. R. Desai. Indian J. Pediat. 34(229):31-33, 1967.

7007 REVIEW OF THE NEUROMUSCULAR ABNORMALITIES IN ACHALASIA OF THE ESOPHAGUS, CONGENITAL PYLORIC STENOSIS AND CONGENITAL AGANGLIONIC MEGACOLON. (E.) Reyes, F. A. (U. Kansas Med. Ctr., Kansas City) and S. R. Friesen. Rev. Surg. (Phila.) 24(3):153-162, 1967.

7008 ESOPHAGEAL BURNS IN CHILDREN. (Dut.) Van Heyst, A. N. P. (Hosp. Acad., Utrecht, Netherlands) and C. C. Leibbrandt. Nederl. T. Geneesk. 111(22):1000-1003, 1967.

7009 SURGICAL TACTICS IN ESOPHAGEO-BRONCHEAL AND ESOPHAGEO-TRACHEAL FISTULAS. (Rus.) Krasovitov, V. K. (Kuban Med.

Inst., Krasnodar, USSR). Klin. Khir. (Kiev) (5):18-21, 1967.

7010 CONGENITAL TRACHEO-ESOPHAGEAL FISTULA: RECURRENCE AFTER REPAIR. (E.) Cowley, L. L. (U. California, Los Angeles). Amer. Surg. 33(5):409-410, 1967.

7011 ANATOMIC DATA ON THE USE OF TRANSVERSE ISOERISTALTIC COLON FOR ESOPHAGOPLASTY. (Fr.) Pouyet, M. (Fac. Med., Lyon, France), P. Bérard, G. Bousquet, M. Giraud and J. Duquesnel. Lyon Chir. 63(2):199-206, 1967.

7012 COLONIC REPLACEMENT OF THE OESOPHAGUS. SOME OBSERVATIONS ON INFARCTION AND WOUND LEAKAGE. (E.) Nicks, R. (Roy. Prince Alfred Hosp., Sydney, Australia). Brit. J. Surg. 54(2):124-128, 1967.

7013 PERMANENT CERVICAL ESOPHAGOSTOMA FOR FEEDING. (E.) Weissberg, D. (Albert Einstein Coll. Med., New York, N. Y.) and A. N. Papaioannou. Surg. Gynec. Obstet. 124(5): 1079-1080, 1967.

7014 COLONIC RECONSTRUCTION OF THE ESOPHAGUS IN INFANTS AND CHILDREN. (E.) Gross, R. E. (Child. Hosp. Med. Ctr., Boston, Mass.) and F. N. Firestone. Surgery 61(6):955-964, 1967.

7015 ESOPHAGO-ILEAL-COLOPLASTY FOR CICATRICIAL STENOSIS OF THE ESOPHAGUS. (Fr.) Morino, F. (U. Parma, Italy), G. Guglielmini and P. Silvestrini. Presse Med. 75(8):401-402, 1967.

7016 HIATAL HERNIA: CLINICAL STUDY, SURGERY AND RESULTS IN 55 CASES. (Sp.) Llaurado Tomas, A. (Sta. Cruz & Sn. Pablo Hosp., Barcelona, Spain), R. Camprodon Bertran, J. Isern Aris and E. Torres Torreblanca. Rev. Esp. Enferm. Apar. Dig. 26(1):29-42, 1967.

7017 SURGICAL TREATMENT FOR THE COMPLICATIONS OF HIATAL HERNIA. (E.) Sanderud, A. (U. Oslo). Acta Chir. Scand. 133(3):223-227, 1967.

7018 HERNIA OF THE DIAPHRAGMATIC CUPOLA IN THE CHILD. (Fr.) Jaubert de Beaujeu, M. Lyon Chir. 63(2):294-304, 1967.

7019 IATROGENIC AND SPONTANEOUS PERFORATION OF THE ESOPHAGUS. (E.) Johnson, J. (U. Pennsylvania Hosp., Philadelphia) and C. W. Schwegman. Amer. J. Gastroent. 47(5): 365-372, 1967.

7020 SPONTANEOUS RUPTURE OF THE OESOPHAGUS. (E.) Tidman, M. K. (St. Martin's Hosp Bath, England) and H. T. John. Brit. J. Surg. 54(4):286-292, 1967.

7021 SPONTANEOUS RUPTURE OF THE OESOPHAGUS. (E.) Hamilton, S. G. I. (Royal Devon Exeter Hosp., England). Brit. J. Surg. 54(4): 304-306, 1967.

7022 TREATMENT OF CANCER OF THE ESOPHAGUS BY SWEET'S OPERATION. (Fr.) Barrié, J., Latreille, P. Groulier, J. J. Bocchio, J. Miguet and J. Ronzy. Lyon Chir. 63(2):249-254, 1967.

7023 NEOPLASMS OF THE ESOPHAGUS. (Nor.) Neset, G. (State Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):806-807, 1967.

7024 SURVIVAL IN CARCINOMA OF THE ESOPHAGUS (E.) Boyd, D. P. and M. C. C. Kim. Surg. Clin. N. Amer. 47(3):613-620, 1967.

7025 CLINICAL AND STATISTICAL ANALYSIS OF CASES OF ESOPHAGEAL CANCER OBSERVED AT THE "O. ALBERTI" INSTITUTE FROM 1950 TO 1965. (It.) Cossu, F. (Civil Hosp., Brescia, Italy). Radiol. Med. (Torino) 53(4):356-372, 1967.

7026 REFLUX ESOPHAGITIS AFTER GASTRIC RESECTION. (Rus.) Grigor'ev, M. S. (Leningrad Pediat. Med. Inst., USSR) and A. G. Kononov. Vestn. Khir. Grekov. 98(5):12-15, 196

See also abstract nos.: 6646,7032,7036,7215

27 GASTRIC SUMP DRAINAGE WITH WATER SEAL MONITOR. (E.) Hughes, R. K. (Wads-
rth Hosp., Los Angeles, Calif.) and D. G.
otton. Surgery 61(2):192-195, 1967.

e use of a gastric sump tube with a water seal
ainage monitor was compared to standard gas-
ic drainage with a Levin tube. In use, a
uble lumen sump tube was passed into the
omach. One tube was connected to the water-
vered tube of a water seal drainage bottle.
v suction was placed on the bottle. In
eration air was drawn through the open tube of
e sump tube into the stomach where it and what-
er fluid present was pulled up the other tube
the drainage bottle. A continuous bubbling
the drainage bottle indicated the system was
operation. Two groups of adult male patients
eding gastric decompression were selected at
ndom. Ten received standard gastric suction.
e other 10 received gastric sump suction. The
np tube drained an av. of 723 ml/24 hr. com-
red to 622 ml/24 hr. for the Levin tube. The
np tube required an av. of 3.7 inj. of air and
5 irrigations/24 hr. The Levin tube was
rigated an av. of 7.9 times/24 hr. The nurses
volved expressed a strong preference for the
stric sump system. Cited as disadvantages are
e apparent need for large vol. of electrolyte
placement, longer periods of ineffective
ristalsis and later passage of flatus.

8 VISCOSITY OF WHOLE BLOOD AND PLASMA IN PROVOKED DUMPING ATTACK. (E.)
ristoffersson, E. (U. Goteborg, Sweden), C. M.
lenstam and B. Zederfeldt. Acta Chir. Scand.
(1):1-3, 1967.

rtially gastrectomized patients (6 men, 5
nen) with clinical dumping symptoms had dump-
induced by p.o. admin. of 150 ml 50% glucose
n. in the morning after overnight fast. Ten
samples of cubital vein blood were withdrawn
ore and 10, 20, and 30 min. after glucose
in. Hematocrit, whole-blood and plasma
cosity were determined. All 11 showed an
rease in whole blood viscosity which reached
. in 2 after 10 min., in 7 after 20, in 2
er 30. Differences of the max. changes from
trol values were 28%, 22%, 21%, 21% for shear
es 23, 46, 115, 230 sec.$^{-1}$, resp. Plasma
cosity increased in 8; unchanged in 3; av.
nge, 5%. Hematocrit increased from 41 to 42,
and 44 after 10, 20, and 30 min., resp.
se rate decreased from an av. of 76 beats/min.
ore induction to 89, 101, and 97 after 10, 20,
30 min., resp. There was no correlation be-
en the degree of symptoms (present in all 11)
the change in viscosity. Increase in whole
od viscosity seemed to be due mainly to
rease in hematocrit. The main effect of
nges on whole blood viscosity would be to
ggerate the difference in flow between
ferent regions.

7029 GASTRIC OUTLET OBSTRUCTION DUE TO CONGENITAL PYLORIC MUCOSAL MEMBRANE. (E.) Sloop, R. D. (Harbor Gen. Hosp., Torrance, Calif.) and A. C. W. Montague. Ann. Surg. 165(4):598-604, 1967.

A 41-yr.-old woman with postprandial nausea and bloating of 2-mo. duration, with vomiting in the last 10 days, is described. In the wk. preceding admission, diffuse epigastric pain and anorexia appeared and she lost 9 pounds. On admission the abdomen was distended, tympanitic and slightly tender; voluntary guarding was present; stool occult blood tests were negative. Abdominal X-ray showed a massively distended stomach, filled with food and gas, occupying most of the abdominal cavity, and descending to the level of S-1. Immediate treatment was aspiration of stomach contents (3 liter) through an Ewald tube; continuous nasogastric suction; i.v. fluids. After 8 days, overnight gastric residuals still measured 100-150 ml. Because of antacid therapy, no measurement of acid secretion was made. At operation (8 days) the antral-pyloric and duodenal serosa appeared normal. A longitudinal incision was made through the pyloric antrum, exposing and partially dividing the margins of an occluding transverse membrane 2.5 cm proximal to the pylorus. Membrane surfaces were covered with smooth normal mucosa and between mucosal layers was a thin layer of tissue continuous with and analogous to antral submucosa. An aperture (diameter less than 1 mm) through the thin and scarred central portion of the membrane was observed. Gastric musculature proximal to membrane was hypertrophied to the thickness of the pylorus. The membrane was divided, rather than excised, to prevent a circumferential scar. Posteriorly, the incision was carried into the proximal and distal antral mucosa; the longitudinal mucosal incision was closed transversely; the antrotomy was extended and closed as a Heineke-Mikulicz pyloroplasty; truncal vagotomy was performed. The postoperative course was uncomplicated, and the patient resumed normal eating habits. A review of the literature on membranous stenosis of the adult pyloric antrum and on pyloric membranous atresia is presented.

7030 NECESSARY THERAPEUTIC PRECAUTIONS IN THE ANESTHESIA AND REANIMATION OF PATIENTS WITH INFANTILE HYPERTROPHIC PYLORIC STENOSIS. (It.) Marangoni, G. (Civil Hosp., San Donà di Piave, Italy). Acta Anaesth. (Padova) 17(3):351-369, 1966.

A review of preoperative treatment, anesthesia, surgery and postoperative management of infantile hypertrophic pyloric stenosis includes 3 illustrative case histories, emphasizes the importance of correcting such biochemical disturbances as hypochloremia, alkalosis, hypokalemia, etc., prior to surgical intervention. The anesthetic procedure of choice is said to be orotracheal intubation.

7031 GASTRIC ANALYSIS AS A SCREENING MEASURE FOR CANCER OF THE STOMACH. (E.)

Gilbertsen, V. A. (U. Minnesota Med. Ctr., Minneapolis) and G. L. Knatterud. *Cancer* 20(1):127-133, 1967.

Gastric acidity by the tube-Toepfer technic in 3,239 seemingly normal persons over age 45 (median age was 55 yr.) showed achlorhydria in 708 subjects (22%), hypochlorhydria in 777 subjects (24%) and normal acid production in 1,754 subjects (54.1%). In measuring gastric acidity as a prognostic sign, 529 patients in a 9-yr. period with known gastric cancer were reviewed. Of these patients, 409 had undergone histamine gastric analysis (77%). There were 56 patients with a 5-yr. survival rate (10.6%). Of the 409 patients with gastric analyses, 46 patients (11.2%) survived more than 5 yr., while 10 patients (8.3%) of the remaining 120 patients without histamine analysis survived longer than 5 yr. Approx. 280 of 409 patients with stomach cancer would have been diagnosed by determination of their achlorhydria. Histamine analysis showed that 49 patients (12%) were hypochlorhydric, while the remaining 80 patients (19.5%) had normal acid values. The overall 5-yr. survival rate was 54%, 13% and 33% for achlorhydria, hypochlorhydria and normality, resp. The 5-yr. survival rate for the 409 cancer patients was 25 (8.9%), 6 (12.2%) and 15 (18.8%) for the achlorhydria, hypochlorhydria and normal groups, resp. Gastric analysis as a screening test was not practical in the early detection of gastric cancer, but did manifest significant prognostic value.

7032 GALLSTONES, GASTRIC SECRETION, AND FLATULENT DYSPEPSIA. (E.)

Capper, W. M. (Southmead Hosp., Bristol, England), T. J. Butler, J. O. Kilby and M. J. Gibson. *Lancet* 1(7487):413-415, 1967.

Of 50 patients observed with cholelithiasis, 26 gave evidence of gastric hyposecretion with the augmented histamine test. Of 18 patients with cholelithiasis and tested with the pyloric-regurgitation test, 16 showed persistent reflux of duodenal contents. Pyloric incompetence is usual in patients with gallstones, and gastric hyposecretion is also common. With gallstone formation, duodenal reflux may produce dysfunction and destruction of oxyntic cells. These changes usually cause hyposecretion, and the presence in the stomach of pancreatic juice and bile may cause flatulent dyspepsia. If cardiac incompetence is present, the passage of duodenal contents, with or without gastric juices, into the esophagus may produce heartburn. Pylorospasm is the commonly accepted mechanism of flatulent dyspepsia. It is suggested that the reverse is true.

7033 INTRAGASTRIC PHOTOGRAPHIC STUDY OF ANTIFOAMING AGENTS. (E.)

Hoon, J. R. (Sheboygan Clin., Wisc.). *Industr. Med. Surg.* 36(5):321-327, 1967.

Intragastric photography was by Gastrocamera with and without Fiberscope. The agents were admin. either after removal of camera (which had photographed unmedicated stomach) and followed by replacement of camera; or by inj. through a small plastic tube attached to camera or by p.o. insertion of camera and scope and inj. of material through transnasal Levin tube. The agents studied all contained simethicone. In *in vitro* studies the camera photographed tes drugs on freshly resected stomachs with peptic ulcer and on freshly resected autopsy stomachs, using (simethicone, 40 mg/tablet).
Young men (16-22 yr.) and several older men with gastritis were studied because of the known increase of mucus and mucus bubbling in younger subjects and those with gastritis. Studies with resected stomachs showed that a mass of bubbles could obstruct medication from mixing with an acid component and how this coul be overcome by an antifoaming compound. Clearing of the stomach from mucus bubbling was photographed by Gastrocamera 10 min. after admi of simethicone (dosage 8 drops). There was a marked reduction of mucus bubbling compared to premedication film. Existence of a time factor with some simethicone preparations was suggeste by the fact that at 10 min. after admin. of (simethicone 20 mg/ml) there was no destruction of bubbling, and this only occurred after a greater time interval. This time factor was studied using the head of foam on a glass of beer. It is concluded that in the preparations studied, simethicone usually produced a good reduction of mucus bubbling.

7034 VARIATIONS IN ARGENTAFFIN CELLS IN EXPERIMENTAL GASTRITIS. (E.)

Rodriguez-Olleros, A. (U. Puerto Rico, Santurce and R. Barroso-Moguel. *Amer. J. Gastroent.* 47(4):293-298, 1967.

Atrophic gastritis in rabbits was studied by inducing production of tissue-specific antibodies by sensitization with human gastric juic dialyzed at 2° for 72 hr. and dried under vacuum. Antigen was admin. (12 mg supernatant in saline soln.) i.v., biweekly for 12 wk. Papillomatous gastritis was induced in rabbits by instillation of 1.5 ml 0.5% croton oil in alcohol-ether (1:1) biweekly for 6-9 wk. Ulcerative gastritis was induced in dogs by admin. of 2 g cincophen twice in 1 wk.; animals were sacrificed 6-10 days after last dose. The stomach of each animal was fixed in formalin an sections made for staining with hematoxylin-eosin and with the argentaffin cell method of Barroso-Moguel. In atrophic gastritis, the argentaffin cells were definitely reduced in number. In papillomatous gastritis, there was an early necrotic phase during which the

rgentaffin cells were markedly increased.
ter approx. 12 admin. of croton oil, papilloma-
us growth began to appear and the argentaffin
lls became displaced. In ulcerative gastritis,
rgentaffin cells were absent in the edematous
crotizing phase, marked by appearance of
ripheral metaplasia in the mucosa. The
sults support the theory that the mesenchyma-
us cells of the gastric mucosa and other
milar cells in chronic infiltrates may
ntribute to the clinical picture of gastritis.
ey could also contribute to the histological
velopment of lesions as observed in the course
the various forms of gastritis.

35 THE EFFECTS OF NICOTINIC ACID ON
SEVERAL ASPECTS OF GASTRIC FUNCTION AND
THE HISTOLOGY OF THE GASTRIC MUCOSA. A
OPSY STUDY. (It.) Abbona, C. (U. Genoa,
aly), G. Peris, P. L. Gatto, G. C. Benzante,
Indiveri and A. Berretti. Arch. Maragliano
t. Clin. 22(4):425-438, 1966.

ngle doses of nicotinic acid (60 mg, i.v.; or
0-150 mg, p.o.) were admin. to a total of 20
bjects, aged 20-68 yr. (4 of 20 with normal
stric mucosa, as determined by biopsy; 8 of 20
th chronic, superficial gastritis; 6 of 20
th chronic, preatrophic gastritis; 2 of 20
th chronic, atrophic gastritis). The drug
duced a somewhat delayed, transitory increase
both the total vol. of gastric secretion and
e amount of free acid contained in it (in
rms of HCl/mEq/liter). The effect was some-
at greater than that induced by maintaining a
stric sound in situ for 1 hr. or by admin. of
ffeine and sodium benzoate (10 mg, single i.m.
se); it was less marked than that induced by
imulation with histamine chloride (1 mg, single
n. dose). Pretreatment with nicotinic acid
mg/day for 3-20 days, i.v.; or 150-200 mg/
for 8-15 days, p.o.) failed to influence
sponse to the other stimuli significantly.
en when pretreatment was prolonged to as
ch as 20 days, no significant changes in the
rmal gastric epithelium or gastric function
peared to result, although a reduction of
terstitial hemorrhaging was seen in the
stric mucosa of patients in whom this phenomenon
present.

36 MODIFICATIONS IN THE PYLORUS DURING
HIATAL HERNIAS IN THE ADULT. (Fr.)
rie, P., M. Cachin, F. Pergola, E. Parnaud
G. Le Gland. Arch. Franc. Mal. Appar. Dig.
(1-2):17-31, 1967.

15 cases of hiatal hernias, the classical
gical treatment was complemented by a
otomy and pyloroplasty. The pyloroplasty
sisted of an anterior pylorectomy followed
a vertical, linear suture which doubled the
meter of the pylorus and permitted examination.
palpation of the sectioned pylorus it was
nd to be hypertrophic in 9 cases ranging between 8-12 mm in thickness with massive hypertrophy in 2 cases. In 3 other cases the pylorus was sclerotic and in the final 3 cases it was found to be normal. Histologically, the hypertrophied pylorus produced a pseudomyoma with anarchic fibers which affected only the inner curvature. Much of the hypertrophy seemed to be due to edema which led to the impression that these lesions evolved from edema following muscular hyperplasia, terminating in sclerosis. The only clinical sign of this pyloric hypertrophy was a history of vomiting, indicating functional difficulty; such histories were noted in 7 of 10 cases. The hypertrophy seemed to be neither congenital nor secondary to the hernia, but would seem to explain the digestive discomforts often experienced after a regular hiatal hernia. It was concluded from these 15 cases, that from a therapeutic point of view a pyloroplasty should be added to the classical surgical cure of hiatal hernia in cases of pyloric hypertrophy, but vagotomy offers more disadvantages than advantages.

7037 THE PROBLEM OF QUALIFICATION FOR MILITARY SERVICE OF PAIN IN THE EPIGASTRIUM. (Fr.) Dupre, N. (R. Picque Hosp. Milit. Instruct., Bordeaux, France), C. Jean-Jean, C. Jeanneton, J. Peducasse, L. Girier and M. Couture. Bull. Soc. Med. Milit. Franc. 5:233-234, 1966.

Clinical, biological (histamine test for total acidity), radiological and psychological tests were conducted on 50 male patients (av. age of 20 yr.) who were hospitalized for gastroduodenal difficulties to determine their qualification for military service. Gastric ulcers were discovered in 16 of these patients of whom 50% presented a typical ulcer syndrome. In 57% the gastric chemistry revealed hyperchlorhydria, 37% presented a history of childhood gastric complaints, 58% were classified as presenting emotional immaturity and 37% gave histories of social and professional instability. Of the other 34 patients, 50% showed hypoacidic gastric chemistry while 29% showed normal gastric chemistry, 50% presented a history of childhood gastric complaints and 62% were classified as having neurotic personalities. Of those epigastralgic patients without ulcers who showed traits of a neurotic personality, 5 of 7 gave a clinical symptomatology of hyposthenic dyspepsia and 6 of 7 gave a history of childhood gastric complaints. Of these patients that were classified as having emotional immaturity, 50% gave a hereditary history of ulcers, 75% showed radiological evidence of gastrobulboduodenal lesions, whereas those dyspeptics with neurotic personality traits gave no significant history of hereditary ulcers and in 50% the radiological studies were totally normal.

7038 CHROMATOGRAPHIC ANALYSIS OF FREE AMINO ACIDS IN THE GASTRIC JUICE, USING

ION-EXCHANGE RESINS. (It.) Gandolfi, L. (U. Bologna, Italy), G. F. Piva and P. Vannini. Arch. Ital. Mal. Appar. Dig. 32(6):575-580, 1966.

The amounts of 21 free amino acids contained in gastric secretion following histamine stimulation were determined for a normal subject, a patient with chronic gastritic hypochlorhydria and a patient with gastric carcinoma, and expressed as functions of alanine = 1. In the normal subject, taurine, phosphoethanolamine, glutamic acid, tyrosine, leucine and phenylalanine were demonstrable in quantities ranging from 1.17-2.50 times the amount of alanine present; aspartic acid, threonine, serine, asparagine, proline and arginine were demonstrable in quantities ranging from 0.73-0.16 times the amount of alanine present; lysine and glycine showed values essentially equal to that found for alanine; valine, methionine, isoleucine, glucosamine and histidine were present only in trace quantities. In the gastritic patient, the alanine level was substantially the same as in the normal subject (200.93 versus 256.12 μg/100 ml, resp.); significantly increased were the levels of aspartic acid (from 0.49-1.24), threonine (0.32-0.78), serine (0.51-1.03), proline (0.73-1.67), leucine (1.28-2.26), phenylalanine (1.17-2.78) and lysine (1.00-7.65). The quantity of urea present was decreased from 32.64-14.76. In the patient with gastric carcinoma, urea was further decreased (to 4.20) and alanine was increased (from 256.1 μg%, normal subject, to 962.0 μg%). Also increased significantly, as compared to the normal subject, were leucine (1.28-2.18), arginine (0.16-0.86), phenylalanine (1.17-4.01). Decreased were phosphoethanolamine (2.13-0.20), taurine (2.50-1.46) and aspartic acid (0.49-0.14). Also increased significantly were several compounds found only in trace amounts in the normal and gastritic subjects: valine = 0.77, methionine = 0.25, isoleucine = 0.33, histidine = 2.59. The total amount of free amino acids was also increased markedly in the patient with gastric carcinoma.

7039 VASCULARIZATION OF THE PART OF THE STOMACH REMAINING AFTER OPERATIONS INVOLVING GASTRIC RESECTION. ANATOMICAL-RADIOLOGIC STUDY. (It.) Di Bartolomeo, A. (U. Rome, Italy) and L. Gioffrè. Ann. Ital. Chir. 42(11-12):1064-1075, 1966.

As compared with 5 control preparations, examination of 5 autopsy preparations derived from patients aged 30-50 yr. who had undergone gastric resection for gastric or duodenal ulcer confirmed the development of an extensive, anastomotic, parietal network of vessels which vascularized all of the remaining part of the stomach, as well as the site of gastroenteroanastomosis, in optimal fashion, appearing to preclude any likelihood of a patient's developing ischemia which might facilitate dehiscence of the anastomosis or delay of cicatrization. In all cases the source of the networ appeared to be the terminal branches of the gastr epiploic artery, emphasizing the importance of operating in such fashion that postoperative vascularization is not dependent upon anastomoses between the left gastro-epiploic artery and its right homonym, which tend to be either unreliabl or essentiallly inadequate.

7040 ENDOSCOPIC STUDIES OF GASTRIC DYNAMICS DURING THE EFFECTIVE PERIOD OF MEDICATION. EFFECTS OF WHOLE EXTRACT OF THE POSTERIOR LOBE OF THE PITUITARY. (It.) Mazzone, O. (U. Catania, Italy), A. Blasi and F. Sorrentino. Minerva Med. Siciliana 11(3): 57-58, 1966.

Posterior pituitary extract was admin. to 5 normal subjects and 5 who were suffering from chronic catarrhal gastritis. The group as a whole (6 men, 4 women) ranged from 29-55 yr. in age. In 1 of 10, the peristaltic wave was considerably decreased in force and its duration was appreciably prolonged. In 9 of 10, admin. of the drug was followed by a complete arrest of gastric motility, appearing within 4-10 min. and lasting 6-50 min. prior to the onset of gradual recovery. In all cases, both the pyloric sphincter and the walls of the antral region were relaxed significantly during the period when the drug was active. It is pointed out that these findings are directly at variance with the widely-held belief that this drug has a stimulating effect on the smooth musculature of the gastrointestinal tract.

7041 A STUDY OF SURVIVAL PATTERNS IN PATIENTS WITH GASTRIC CARCINOMA. (E.) Goldenberg, I. S. (Yale U. Sch. Med., New Haven, Conn.), J. M. Cohen and D. G. Skinner. Surg. Gynec. Obstet. 124(2):241-250, 1967.

In a 38-yr. study, 2- and 5-yr. survival rates were correlated with other patient data from 622 patients (male:female ratio 2:1) with confirmed adenocarcinoma of the stomach. An increased incidence was noted in elderly patients. Median age of female patients was 55 yr. (1921-1929) and increased to 65 yr. (1950-1959) while contrastin to 57 and 67 yr. in male patients for the same periods, resp. Poorer survival rates, which were not statistically significant, were observed in the lowest economic group and in tobacco users (no significant difference between cigarette and noncigarette smokers). Long duration of symptoms paralleled long survival rates. Survival time was significantly improved when the patient was in a state of good nutrition without demonstrable abdominal mass or hepatomegaly and had normal stool habits. Laboratory studies generally were not statistically significant when compared with survival rates. Gastrointestinal hemorrhage, occult or massive,

curred in 36% of the entire group and
ggested a continued use of routine stool
amination for blood. Survival was lowest in
tients who evidenced no roentgenologic
normality but who had proximal gastric lesions.
rvival time was increased generally when the
sion involved the lower half of the lesser
rvature, especially the prepyloric curvature
association with anterior surface involve-
nt to the level of the muscularis mucosae
ly. Attempted curative surgery as opposed to
lliative resection, max. tumor diameter of
9 cm and the absence of lymph node spread
re significantly related to an improved
ognosis.

42 GASTRIC AND SMALL INTESTINE DYSKINESIA AFTER VAGOTOMY. (Fr.)

Lortat-Jacob,
L. (Beaujon Hosp., Clichy-Paris), A. Cornet,
René, J. Guerre and L. Blanc. Bull. Soc.
d. Hop. Paris 118(2):187-193, 1967.

mplete improvement was obtained by the admin.
metoclopramide with the disappearance of the
skinesis which had followed vagotomies in 4
ses. Two cases included patients who had
dergone gastrectomies for duodenal ulcers
ose condition was complicated 1-8 yr. later
nausea, epigastric pain, diarrhea and wt.
ss; additional treatment was required.
e patient received 15 mg/day p.o. of meto-
opramide and the other, whose difficulties
re more severe, first received 20 mg/day i.p.
lowed by daily oral doses as improvement
curred. The other 2 cases concerned patients
o had undergone double vagotomies and gastro-
terostomies for treatment of duodenal ulcers.
these cases painful belching epigastritis
lowing meals, nausea, anorexia and, in one
se, diarrhea, began to occur 3-18 mo. after
rgery. The more severe case was treated with
mg i.p. as well as 3 tablets each day for 3
while the other case was stabilized by oral
blets 3 times a day. In 6 other cases the
. admin. of 10 mg of metoclopramide
cilitated the passage of any opaque medium
radiological exploration. These cases
cluded 3 esophagastrectomies for esophageal
ncer (2) and degenerated cardiac ulcers (1),
ith double vagotomies and gastroenterostomy
duodenal ulcer and 1 with a double vagotomy
gastrectomy.

43 CLINICAL STUDIES OF IRON ABSORPTION AFTER GASTRIC SURGERY. (Ger.)

Kuss,
(U. Bonn, Germany). Aerztl. Forsch. 20(3):
-126, 1966.

absorption of Fe was studied in 23 normal
sons, 22 patients with gastric carcinoma, 12
h gastric ulcer, 12 with duodenal ulcer, 4
es of cardiospasm, 2 with pyloric stenosis,
ith peptic ulcer of the jejunum after
lroth II gastrectomy, and in 1 case of
troenterostomy. Fe absorption was also
studied in 12 cases of esophagoantrostomy, 6 instances of esophagogastrostomy, 6 patients with Billroth I and 9 with Billroth II constructions, 6 having total gastrectomy with V-shaped esophagojejunostomy, 9 with complete gastrectomy replaced by the small intestine. Absorption of Fe was tested in single instances of gastric fornix carcinoma, penetrating ulcer of the lesser curvature, stomach body carcinoma, Billroth II reformed 2.5 yr. later as a Billroth II in a patient who had had peptic ulcer, another with stump gastritis original Billroth II reformed after 18 yr., and 1 patient with a Billroth II after resection for pyloric stenosis. The serum levels of Fe were obtained at 0, 2, 4, and 6 hr. before and after recovery from operation following a dose of 240 mg Ferro-Sanol p.o. Experiments on absorption of ferrous and ferric ions in intestinal loops in vivo and in vitro were also carried out. The normal fasting serum levels of Fe in man lie between 120-150 μg% and in women between 80-100 μg%. After the oral admin. of 240 mg of ferrous iron, the serum level rose by approximately 100 μg%. When the serum level is increased to 220-250 μg% in the course of 6 hr. this cannot be constructed as pathologic; a minimum increase of 50 mg% is to be expected with an oral dosage of 240 mg. The normal curves usually lay between these limits; 2 types of normal curves were observed, 1 with the highest serum level at 2 hr. after oral dosage and the other with the highest level at 4 hr. In general, the Fe serum level curves of all pathologic conditions studied were high or within the normal range prior to surgery; after surgery the serum levels were lower but still within the normal range. Oral admin. of ferrous iron showed no specific relation to the disease or the particular type of operation, considered singly or in terms of the av. Ferric iron was absorbed from loops and in vitro as readily, however, as ferrous iron. In an acid medium, absorption of ferric iron was less inhibited than the absorption of ferrous iron. The pH therefore has some effect upon absorption. Numerous factors both extra- and intracellular seem to determine absorption of iron among other substances; decreased metabolism, decreased bile secretion, reduction of absorptive surface, and atrophy of the mucosa all can decrease absorption.

7044 DIFFICULTY IN DIAGNOSIS OF MUCOSAL EROSIONS IN THE PYLORUS. (Ger.)

Szeleczky, G. (U. Debrecen, Hungary). Langenbeck. Arch. Klin. Chir. 317(1):14-21, 1967.

A report is presented of 2 cases with similar symptoms including cramp-like pains in the right upper gastric region radiating backwards. In 1 case stomach ulcer or tumor was suspected. Upon gastrotomy no lesions were found in the body of the stomach; the incision was continued into the pylorus; here ulcerations the size of linseed and multiple erosions the size of rice grains were discovered. The tunica propria of the mucosa was intensively infiltrated by plasma cells and lymphocytes; there was moderate subserous connective tissue proliferation in the regions of the erosions. The other case was diagnosed as polyposis of the stomach. Gastrotomy failed to reveal polyposis; extension of the incision into the pyloric region again revealed linseed-sized ulcerations and many small erosions all within the boundaries of the pylorus. In view of the long term symptoms experienced by these patients the lesions must either heal leaving no trace, or, after an interval, transform into a peptic ulcer. The circularly-located erosions, restricted to the pylorus and chiefly to the pyloric ring, cause the same difficulty as a duodenal ulcer: a delayed emptying of the pylorus (functional stenosis). Operations which are simple gastric sections are unsuccessful in this condition. The pyloric ring must be carefully examined, palpated and even transected; otherwise the erosions cannot be diagnosed. In view of the 2 cases outlined, it is suggested that the best surgical management of the disorder is vagotomy and pyloroplasty.

7045 RELATIONSHIP BETWEEN FINDINGS IN THE GASTRIC MUCOSA AND GASTRIC DISEASES AND SECRETION OF ABH-SUBSTANCES. (Ger.) Berg, G. (U. Erlangen-Nurnberg, Germany), H. Mayer, K. Heinkel and T. Schricker. Munchen. Med. Wschr. 109(8):401-406, 1967.

The relationship between the condition of the gastric mucosa, more specifically the degree of inflammation or atrophy, and also the distinct type of clinical disorder, as ulcer and carcinoma, and the blood groups (agglutinogens) including Rh of these individuals was investigated; also determined was the percentage of subjects who were secretors (salivary) of specific agglutinins. For the blood grouping direct typing was done; then the serum was tested for agglutinins with washed RBC of known groups. Agglutinogens A_2 (H), B, and O were discovered among those tested but not one instance of A_1 was found. The procedures used were carefully standardized. Those tested were grouped in 2 ways; 322 had biopsies taken of the gastric mucosa; among these were 101 normal subjects, 89 with moderate inflammation, 27 with severe inflammation, 29 with beginning atrophy, 63 with atrophy, and 13 with intestinal metaplasia; 78 did not undergo biopsies. On the basis of clinical diagnoses 60 individuals had healthy stomachs, 92 had duodenal ulcer, 78 gastric ulcer, 46 gastric carcinoma, 48 chronic bronchitis, 49 diabetes mellitus, and 27 with acute and chronic pancreatitis. Of the 400 subjects 313 or 78.25% were secretors and 87 or 21.75% were nonsecretors. On the basis of 322 cases 146 were Group A, 78.8% secretors; 38 Group B, 68.4% secretors; 15 Group AB, 80% secretors; and 123 Group O, 79.7% secretors. The distribution of those with biopsies in relation to the condition of the gastric mucosa and the international blood groups showed a close correlation between the actual number of subjects and their percentage in the group; thus among 89 with moderate inflammation of the mucosa, 45 (50.6%) were in Group A, 9 (10.1%) in Group B, 3 (3.3%) in Group AB, and 32 (36%) in Group O. No significant differences existed between condition of the gastric mucosa and the blood groups. Comparison of the percentages of secretors (67.4%) and nonsecretors (32.6%) in patients with duodenal ulcers to those in other gastric disorders or to the normal values (83 + 17%) demonstrates that these figures are significant. Only in this instance did such a difference appear in this investigation and the total number of cases may have been too small.

7046 GASTRIC RESECTION AND ALCOHOLISM. (Ger.) Reichmann, J. (Karl Marx U., Leipzig, Germany) and L. Pöcker. Z. Aerztl. Fortbild. (Jena) 61(9):489-493, 1967.

An inquiry was made into the relationship between gastric resection and alcoholism in 2 groups of persons, 1 group of 310 subjects with gastric resection, and the other group of 592 institutionalized alcoholics. Among the resected, 165 (53.2%) stated that they enjoyed alcohol as much as before surgery although their tolerance was not as great; 71 (22.9%) declared that they had not used alcoholic beverages before the operation but would do so now. Seven (2.26%) men had taken to drink in the past 2 yr. (their resections were about 3.5 yr. old) and were in difficulty with respect to work, families, or police. Five (1.6%, 3 men and 2 women) had been heavy drinkers before operation and continued to be so afterward; 14 (4.5%) were occasional drinkers with ulcers; 9 (2.9%) began to drink occasionally after resection; 14 (4.5%) others denied any consumption of alcohol. Among the 592 institutionalized alcoholics, 56 (9.5%) had undergone stomach resection for ulcer. The origin of the alcoholism cannot be the stomach resection in 40 of these 56 cases because their predilection for drink was patently greater at the time of the operation than afterward. Alcoholism is considered to be a disease process with a common beginning and a progressive course. The habituated person uses alcohol, known or unknown to himself, as a working, specific psychic drug. There is no causal relation between gastric resection and alcoholism or, at most, only an occasional relationship. Although drinking may have become more general in the resected group, except in a few cases the drinking was not excessive. On the other hand, the incidence of gastric resection among the alcoholics was too small (9.5%) for alcoholic excess to be the direct and sole cause of ulceration.

7047 THE COURSE OF CHRONIC GASTRITIS. (Ger.) Heinkel, K. (U. Erlangen, Germany), J. Pringot and N. Henning. Munchen. Med. Wschr. 109(14):763-767, 1967.

a total of 7123 patients examined, 360 were
osen for further study by biopsy over a period
at least 3 mo. In 66.6% the histological
ndings remained constant for periods of 1-3
In 10.7% an improvement in morphology
curred within 4 mo., and in 16% a deterioration
s observed. Morphologic changes were only
ghtly dependent upon the time interval be-
een examinations. Marked superficial
tritis and the beginning stage of atrophic
tritis were the most variable findings.
sons in the 40-49 yr. age group most
quently showed changes between the first and
ceeding examinations. Young people and the
erly showed greater stability in existing
ditions of the gastric mucosa. In only 2.5%
a change of 2 or more stages in diagnosis
erved. The diagnostic stages were: (1)
mal, (2) almost normal, (3) moderate super-
ial gastritis, (4) fully-developed superficial
tritis, (5) beginning of atrophic gastritis,
fully developed atrophic gastritis. Patients
h duodenal ulcers showed deterioration more
quently than patients with gastric ulcer.
rovement in troublesome upper abdominal
ptoms occurred in 64.5% of patients
eriencing them, but a corresponding change of
tric morphology did not necessarily occur;
phology and symptoms were not interdependent.
se investigations demonstrate the high
gnostic value of biopsies, not only in gross
ntification but also in fine differentiation.

8 THE RELATION BETWEEN AFFERENT LOOP
SYNDROME AND THE LENGTH OF THE LOOP IN
LROTH II WITH ANTECOLIC GASTROENTEROSTOMY.
r.) Reding, R. (Ernst Moritz Arndt U.,
ifswald, Germany), V. Puschmann and W. Senst.
tsch. Gesundh. 22(12):553-558, 1967.

roup of 255 patients who had undergone
tric resection and Billroth II construction
h antecolic gastroenterostomy during the last
r. were investigated. In the clinical and
oratory studies special emphasis was placed
n the afferent loops in the X-ray films.
ogether in 81 cases the afferent loop was
rt; 74 of these individuals were completely
e of untoward symptoms; in these 74 a reflux
sed covering of the mucosa or a rapid filling
the loop with contrast material occurred;
s was not considered pathological. On the
er hand, in the entire group were 13 with
afferent loop syndrome; based upon clinical
dence and X-ray demonstration of dilated,
erately to excessively-filled afferent loops,
iagnoses of Type I/II and 2 of Type III were
e; in 4 patients (Type IV) obstruction was
plete at the jejunogastral anastomosis
ween the seventh and eleventh postoperative
s. An enteroanastomosis was constructed at
eat surgery. There is a definite correlation
ween the length of the afferent loop in
ecolic gastroenterostomy and postoperative
orders. Only 1 patient of the 81 with short
afferent loops had a mild syndrome (Type I); 5% of all cases had this syndrome.

7049 CHANGES IN THE PATTERN OF LACTIC DEHYDROGENASE ISOENZYMES IN EXPERIMENTAL GASTRIC LESIONS. (Cz.) Procházka, B. (Charles U., Prague), J. Kohout, L. Korbová, V. Jirásek, V. Bárta and M. Procházková. Cas. Lek. Cesk. 105(49-50):1359-1364, 1966.

The total activity of LDH and the levels of 5 LDH isoenzymes (LDH 1, LDH 2, LDH 3, LDH 4, and LDH 5) in the mucosa of the fundus, in that of the pylorus, and muscularis propria of the stomach of normal Wistar rats, starving rats, and rats with experimental gastric lesions, induced by immobilization of starving animals, were compared. The gastric lesions (erosions and hemorrhages) were localized almost exclusively in the fundic mucosa. Supernate obtained after low speed centrifugation of the homogenized tissue was fractionated by agar gel electrophoresis to determine the activity of individual isoenzymes. Changes in the proportion of individual LDH isoenzymes were regarded as reflecting changes in the ratio of energy produced in the tissue by anaerobic glycolysis and oxidative processes (e.g., LDH 1 is predominant in tissue with aerobic, while LDH 5 in that with anaerobic glycolysis). The total LDH activity in fundic mucosa in the vicinity of erosions markedly decreased, while in other parts significantly increased, in comparison with corresponding tissue from control animals. On the other hand, differences were not observed between experimental and control rats in the total LDH activity of the pyloric mucosa, and of the muscle of the fundus or pylorus. The content of LDH 2, LDH 3, but especially of LDH 1, isoenzymes was decreased in the mucosa of the fundus in the vicinity of the lesions, while that of LDH 5 increased, when compared with the fundic mucosa of normal rats. This indicates that in the tissue in the vicinity of lesions a shift towards anaerobic glycolysis occurred. In the rest of the fundic mucosa of rats with gastric lesions the LDH 2 level was increased, whereas that of LDH 3 and LDH 4 decreased. In the pyloric mucosa of rats with gastric lesions the LDH 5 content increased, but the levels of LDH 1, LDH 2, LDH 3, and LDH 4 were decreased. The content of isoenzymes in the muscle of fundus or pylorus was not affected by induction of experimental gastric lesions. Starvation alone also did not affect the level of individual isoenzymes in the whole mucosa of the stomach.

7050 FREQUENCY OF GASTRITIS IN DISORDERS OF THE CARDIA AND ESOPHAGUS. (Ger.) Šetka, J. (Charles U., Prague), H. Dvořáková and B. Bednář. Wien. Z. Inn. Med. 48(2):80-82, 1967.

Thirty patients with incompetence of the terminal esophagus (insufficiency of the cardia) underwent simultaneous biopsies of the gastric mucosa and the esophagus, showed symptoms of a cardia-esophageal irritation for more than 2 yr., with or without a sliding hiatus hernia. These patients had no other gastrointestinal disorders. The diagnosis was established through an esophageal perfusion test, esophagoscopy, X-rays, X-ray cinematography, parietography, cholecysto- and cholangiography. All patients had been under a hygienic and dietetic regimen for at least a yr. The group presented a representative variety of the conditions disrupting the coordinated motility of the stomach. These patients were compared to 30 chronic, hospitalized alcoholics who at the time of the biopsies were in a stabilized condition, had not been treated with disulfiram, and had not recently had any alcohol. None of the alcoholics, as far as could be determined, had ever had any symptoms of a cardia-esophageal irritation. The av. age in both groups was 50 yr. Histologic examination of the biopsies revealed that only 16% of those with insufficiency of the cardia had a normal gastric mucosa; 84% had a chronic gastritis (64%, superficial gastritis, 20%, beginning atrophic gastritis). The simultaneous esophageal biopsies showed an incidence of esophagitis of only 10% among those with insufficiency of the cardia. Forty per cent of the alcoholics had gastritis; 60% had a normal gastric mucosa. In a group of 211 patients, gastritis occurred in 92% after gastric resection, in 100% of those with pernicious anemia.

7051 HCl PRODUCTION OF THE STOMACH AFTER BUTAZOLIDIN. (Ger.) Hemmati, A. (U. Bonn, Germany). Med. Welt 18(18):1140-1143, 1967.

Fasting normal persons (10 men and 10 women) underwent intragastric pH recording by means of the Heidelberg capsule. After the fasting determination, another recording was made during stimulation by caffeine or histamine; the capacity to form HCl was tested in cases of hyper-, normal and hypoacidity using the alkali test time. The subjects were treated for 7 days with 300 mg/day of butazolidin; on the eighth day the intragastric pH measurements were repeated. Ten other subjects underwent exactly the same routine except that a placebo was substituted for the butazolidin. Among the group of 20, 7 had hyperacidity, 5 normal acidity, 4 hypoacidity and 4 anacidity (histamine refractory). The av. pH before butazolidin was 3.77; after butazolidin, 3.71. Using alkali test time: before, 15.00, after 12.75 Free HCl was increased by butazolidin, but titratable acidity was decreased. There was no correlation between acidity and painful reactions to butazolidin. Of the group of 10 subjects, 2 had hyperacitity, 4 normal acidity, 3 hypoacidity, and 2 anacidity. The av. pH before the placebo was 4.380, after the placebo 4.385; alkali test time: before, 17.5; after, 17.8. The relatively small increase in acidity following butazolidin therapy cannot be the cause of severe gastric pain and ulceration.

7052 RESEARCH ON THE ACTION OF METACLOPRAMIDE IN THE STOMACH USING THE ENDORADI CAPSULE-"THE HEIDELBERG CAPSULE". (Ger.) Stillger, E. (U. Heidelberg, Germany). Med. Welt 18(21):1319-1320, 1967.

A "Heidelberg Capsule" was used to follow the action of the drug metaclopromide in the stomach of 12 patients; the capsule is an encapsulated transmitter fitted with the proper transducers; the pH in the range from 1-7 ± 0.5 is continuall transmitted for periods up to 90 min.; the mucin content of the gastric secretion, the bound acid and the acid-forming capacity as well as the motor activity of the stomach can be picked up and transmitted to a girdle antenna and direct-recording receiver. The fasting patient swallowed about 3 g of popcorn to stimulate stomach activity; the capsule attached to a filament of cat gut was then swallowed; the cat gut was taped to the corner of the mouth to prevent the capsule from passing into the small intestine. The pH curves of the 12 patients showed very large individual variations after i. inj. of the drug. However, stimulation of gastr peristalsis occurred 6 min. after i.v. inj. of 20 mg of metaclopramide, reached a max. in 14-2 min. and ceased in about 24 min. Tolerance by the fasting patients was very good without any apparent effect on acid secretion. The increase motility caused opening of the pylorus and reflu of the alkaline duodenal juice into the stomach. Metaclopramide is a distinctly useful adjunct i X-ray diagnosis of the gastrointestinal tract because of its stimulation of motor function. I is also a powerful antiemetic.

7053 NEW PHYSIOLOGIC AND ANATOMIC VIEWPOINT ON THE VAGAL INNERVATION OF STOMACH A ANTRUM WITH RESPECT TO GASTRIC SURGERY. (Ger.) Hart, W. (U. Munich, Germany). Z. Gastroent. 4(6):324-337, 1966.

Gastric acid secretion was studied in patients with Billroth II operations; some had complete bilateral vagotomy; others had the bilateral vag branches to the fundus and the body selectively severed, cutting also the intramural fibers fro these branches to the antrum, but leaving intac the antral ramus of the vagus nerve and a branc of the dorsal vagus which supplies the antrum; nerves form plexi in the antral wall. The total number of patients studied is not stated. The of the stomach contents was measured by an intra gastric glass electrode. The effects of 0.5 mg atropine, 10 ml 5% $NaHCO_3$ soln., p.o., histamin (stated only as 0.3 ml, s.c.), and 16 U i.v. insulin, alone and incombination, were tested upo the intragastric pH. Atropine increased the aci secretion in the patients with selective partial vagotomy by as much as 75% over the secretion stimulated by histamine alone. The effect was only observed during the simultaneous stimulati of the gastric secretion phase brought about by the alkalinization of the gastric contents with $NaHCO_3$. The vagus fibers to the antrum

parently inhibit the release of gastrin.
ropine, by blocking these fibers, causes re-
ase of gastrin, increasing acid secretion by
rietal cells. Atropine caused no change in
id secretion in patients with bilateral, total
gotomy. The increase in acidity in 20 normal
bjects av. 33% when atropine and histamine inj.
llowed the $NaHCO_3$ soln., p.o. as compared
trials without atropine. It is suggested
at the fundus and body of the stomach be
lectively vagotomized at proximal partial
section (30-40%) so that the antral rami of the
gus are retained to inhibit secretion of
strin, thus reducing gastric acidity.

54 THE DIAGNOSTIC ACCURACY OF GASTROSCOPY.
ANALYSIS AND COMPARISON OF ENDOSCOPIC
OPSY FINDINGS IN PATIENTS WITH GASTRIC
THOLOGY. (Ger.) Banaski, D. (Heidberg Hosp.,
mburg, Germany), P. Bünger and E. Seeberger.
nchen. Med. Wschr. 109(8):394-398, 1967.

e comparison of the 2 diagnostic methods,
stroscopy (using the fiberscope), and the
stologic examination of biopsies, was tested
using both methods simultaneously on 840
tients. The overall results showed that 83.5%
all gastritis cases diagnosed by the fiber-
ope were confirmed by biopsy. Conversely, 80%
all gastritis cases diagnosed by biopsy were
so diagnosed by gastroscopy. The comparison
chiefly made in terms of gastritis because
ner diseases were relatively rare in the group
840 patients; hypersecretory, hypermotility
nsitive cases were 2.7%; carcinoma, 2.4%; and
stric ulcers, 5.8%. The comparative scores
the 2 methods: Agreement, gastritis, 143
ses (antrum), 84 (border areas), 303 (fundus);
gastritis, 2 (antrum), 84 (border areas), 70
undus); total 605. Disagreement, 39 cases
ntrum), 19 (border areas), 177 (fundus); total
. The region where the 2 methods differ most
h respect to diagnosis of gastritis is the
ndus. The authors conclude that gastritis is
tter distinguished by the fiberscope although
y by a narrow margin.

5 THE DIAGNOSIS OF MALIGNANT TUMORS OF
THE STOMACH WITH THE AID OF RADIO-
SPHORUS. (Rus.) Shevchenko, I. A. (Kirov
. Acad., Leningrad, USSR). Med. Radiol.
skva) 12(5):13-17, 1967.

6 THE PRACTICAL IMPORTANCE OF DIAGNOSING
CANCER OF THE STOMACH BY MEANS OF RADIO-
SPHORUS. (Rus.) Miroliubov, N. N. (Irkutsk
. Inst., USSR). Med. Radiol. (Moskva) 12(5):
20, 1967.

7 PATHOLOGY OF PRIMARY MALIGNANT NEO-
PLASMS OF THE STOMACH. (E.) Sirsat,
V. (Tata Mem. Hosp., Bombay). Indian J.
cer 4(1):42-54, 1967.

7058 RELIABILITY OF X-RAY DIAGNOSIS OF GASTRIC CARCINOMA. (Ger.) Neutsch, W. D. (Radiol Clin., Erfurt, Germany), E. Schumann and J. Zyrus. Deutsch. Gesundh. 22(20): 928-930, 1967.

7059 STUDIES ON THE APPLICABILITY OF LACTIC ACID DEHYDROGENASE DETERMINATION IN GASTRIC JUICE FOR DIAGNOSIS OF GASTRIC CARCINOMAS. (Ger.) Anger, G. (Med. Klin., Erfurt, Germany) and H. Schmechel. Z. Ges. Inn. Med. 22(3): 85-87, 1967.

7060 THE APPLICATION OF TETRACYCLINES IN DIFFERENTIAL DIAGNOSIS OF STOMACH CANCER. (Rus.) Filov, V. A. (Inst. Oncol., Leningrad, USSR), N. A. Levitskaia and T. B. Shemiakina. Vop. Onkol. 13(2):34-37, 1967.

7061 PECULIARITIES OF METASTASES IN GASTRIC CANCER. (Jap.) Maki, T., S. Majima, K. Yoshida, K. Karube, T. Takahashi, T. Machida, H. Hoshi, K. Ito, T. Hiroki and Y. Kurata. Gan no Rinsho (Jap. J. Cancer Clin.) 13(4):208-217, 1967.

7062 AORTOGRAPHIC OPACIFICATION OF THE GASTRIC FUNDUS SIMULATING NEOPLASM. (E.) Bjorn-Hansen, R. W. (U. Virginia Med. Ctr., Charlottesville) and D. S. O'Brien. Amer. J. Roentgen. 100(2):408-420, 1967.

7063 GIANT HYPERTROPHY OF THE GASTRIC MUCOSA ASSOCIATED WITH CARCINOMA OF THE STOMACH. (E.) Rubin, R. G. (Coney Island Hosp., Brooklyn, N. Y.) and H. Fink. Amer. J. Gastroent. 47(5):379-388, 1967.

7064 PRIMARY GASTRIC SARCOMA. A REVIEW OF THE LITERATURE AND REPORT OF NINE PERSONAL CASES. (E.) Jensen, F. B. (Randers Cent. Hosp., Denmark). Acta Chir. Scand. 133(2): 139-151, 1967.

7065 PROGNOSIS FOR GASTRIC CARCINOMA AFTER SURGICAL TREATMENT WITH RESPECT TO PATHOLOGIC-ANATOMIC STUDY. (Ger.) Yanagisawa, F. (U. Clin. Hamburg, Germany). Bruns Beitr. Klin. Chem. 214(3):356-357, 1967.

7066 THE RADIOLOGICAL DIAGNOSIS OF BENIGN POLYPOID TUMORS OF THE STOMACH. (Ger.) Finke, H. (Albert Schweitzer Hosp., Northeim, Germany). Munchen. Med. Wschr. 109(22): 1223-1226, 1967.

7067 GASTRIC ADENOMAS. 3. MORPHOLOGIC AND HISTOPATHOLOGIC CHARACTERISTICS. (It.)

Fatini, G. (Riuniti Hosp., Florence, Italy), G. Gallenga and T. Greco. Osped. Ital. Chir. 16(1): 1-5, 1967.

7068 CANCER OF THE GASTRIC STUMP AFTER PARTIAL GASTRECTOMY FOR ULCER. (It.) Cavina, E. (U. Pisa, Italy), G. C. Mainardi, R. Esposito and C. A. Angeletti. Osped. Ital. Chir. 16(1):7-20, 1967.

7069 CHRONIC GASTRITIS AND CANCER. (Sp.) Vidal-Colomer, E. (Sta. Cruz & San Pablo Hosp., Barcelona, Spain). Med. Clin. (Barcelona) 48(4):220-231, 1967.

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7114 CONSERVATIVE TREATMENT OF ACUTE GASTRIC HEMORRHAGE. (Ger.) Jakob, (Sonneberg Hosp., Germany). Deutsch. Gesundh. 22(19):880-884, 1967.

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15 ELECTRON MICROSCOPIC EXAMINATION OF
ASPIRATION BIOPSY SAMPLES OF THE STOMACH
AINED BEFORE AND AFTER STIMULATION WITH BETAZOL.
r.) El-Hamalawi, J. (Lubeck Acad. Med.,
many), U. Ritter and N. Dettmer. Z. Gastroent.
):13-19, 1967.

eries of 4-6 biopsies were taken before and
and 90 min. after i.m. inj. of 50 mg of
azole from 5 fasting normal subjects; the biopsy
sue was immediately fixed and prepared for
ctron microscopy; 10-min. portions of gastric
ce were obtained and vol., acid conc. and
al acid determined. All patients had a normal
retory vol. and normal acid production; samples
the biopsy tissues were prepared for light
roscopy; no pathological conditions were found.
the resting chief cells the endoplasmic
iculum consisted of a confluent system of
ute cavities, seen in the electron microscope
a system of more or less parallel membranes
which were found granules of ribonucleic acid;
se granules or ribosomes in conjunction with
apparatus of the endoplasmic reticulum were
olved with the maintenance metabolism of
tein and the synthesis of pepsinogen. The
d-producing parietal cells contained a great
ber of mitochondria. The cytoplasm also
tained a large number of fluid-filled vesicles
reas the endoplasmic reticulum was not promi-
t, so that the electron microscopic pictures
the 2 types of cells were clearly different.
er max. secretory stimulation, the ultra-
ucture of the chief cells and the parietal
ls differed markedly from that of these cells
rest. The endoplasmic reticulum of the chief
ls completely disappeared; this occurred
oughout all the preparations of stimulated
sues. The thickness and general size of the
osomes decreased; all lysosomes surrounded
membranes seemed to have a clearer ground
ucture showing, however, a very dense central
nule which is seldom seen in the resting cell.
er stimulation, lysosomal material was
gregated near the glandular lumen; later
osomes were found in the lumen where they seemed
dissolve and liberate the contained enzyme.
egularly distributed granules of the size of
osomes were seen in the cytoplasm. The
mulated parietal cells showed sac-like
tuberances toward the glandular lumen into
ch the canaliculi arising from the confluent
icles emptied; the size of the single vesicles
not increase during stimulation; the mito-
ndria were arranged in the cell periphery in
se relation to the vesicular-canalicular
uctures. Microvilli were larger and more
erous in active cells.

16 THE X-RAY EXAMINATION OF THE SMALL
INTESTINE TREATED WITH METACLOPRAMIDE.
er.) Nägele, E. (U. Giessen, Germany). Fortschr.
entgenstr. 106(3):441-448, 1967.

The author made 60 X-ray examinations of the small intestine; some patients had normal digestive tracts, the others had suffered digestive tract diseases such as hiatal hernia, gastric or duodenal ulcer, gastric carcinoma, gastric resection. After Billroth II and diverticula of the jejunum and ileum, activity of the compound was the same in healthy and diseased digestive tracts. The dosage varied from 5-30 mg. In 39 of 50 cases, gastric tonus was increased and in 26, definite strengthening of peristalsis occurred. Emptying time of the stomach was decreased in 17 instances to less than 30 min. Better filling of the duodenum occurred in 22 subjects; duodenal peristalsis was not diminished with increased filling; it was, in fact, strengthened in 29 cases. The mucosal relief of the duodenum remained normal. The most striking effect on the digestive tract was the increased peristalsis in the jejumun and ileum recorded in 44 of 50 subjects. This was observed in all 38 cases receiving doses of 20 mg or more; the peristalsis was coordinated, speeding the transport of the small intestinal contents so that in 36 cases the cecum was filled in 30-60 min. This filling occurred in 87% of those receiving 20 mg or more. In spite of the rapidity of intestinal passage there was no diarrhea. X-ray delineation everywhere was of high order.

7117 CHAGASIC DUODENOPATHY. (Por.) De Britto Costa, R. (U. Sao Paulo, Brazil) and F. Gomes de Alcantara. Rev. Brasil Med. 23(3): 158-160, 1966.

A quantitative study of the intramural autonomic plexuses of the first portion of the human duodenum is presented. There was a 50% reduction in the number of ganglionic cells in both Auerbach's and Meissner's plexuses in patients with Chagas' disease. These results are in agreement with other reports obtained at different levels of the duodenum in patients with Chagas' disease. Twenty duodena were studied at autopsy (10 from chagasic cadavers and 10 from non chagasic cadavers). A 50% reduction in the number of ganglionic cells in both plexuses was found, and this morphological change could correspond to various physiological changes. Age ranged from 6-55 yr. in the non chagasic group (6 males, 4 females). The mean count for Auerbach's plexus was 1,432, and for Meissner's plexus it was 1,139. In the chagasic group the age ranged from 20-67 yr. (5 females, 5 males). The mean count for Auerbach's plexus was 763, and it was 564 for Meissner's plexus.

7118 CHAGASIC JEJUNOPATHY. (Por.) Gomes de Alcantara, F. (U. Sao Paulo, Brazil) and R. De Britto Costa. Rev. Brasil. Med. 23(5): 316-317, 1966.

The intramural autonomic plexuses of the human jejunum (first loop, taken from the middle of the loop) were studied in autopsy specimens obtained from 10 subjects with and 10 without Chagas' disease. Serial specimens fixed with formol were used. In specimens from patients with Chagas' disease, the mean number of ganglionic cells in Auerbach's plexus was reduced from 987-664 (= 33%); the mean number of ganglionic cells in Meissner's plexus was reduced from 2053-1331 (= 36%). These results were in accordance with those obtained at other levels of the digestive tract.

7119

ASSESSMENT OF VASCULAR INTEGRITY OF INTESTINAL SEGMENTS BY DYE INJECTION.

(E.) Kwong, K. H. (U. Colorado Med. Ctr., Denver), R. E. Fraser and B. C. Paton. Brit. J. Surg. 54(2):144-146, 1967.

After midline incision, a 20-30-cm segment of pylorus (5 dogs) or right colon (5) (Group 1), supplied by at least 3 branches of the jejunal or ileocecal arteries, was exposed. At 1 end of the segment, the arteries were ligated where they joined the collateral arcade; the intestine was divided and anastomosed, with a single layer of interrupted silk sutures, at a point where the blood supply was intact on 1 side only; at the other end, the intestine was divided and re-anastomosed at a point where blood supply was intact on both sides. Alpha zurine 2G dye was inj. (20 mg/kg) into a peripheral vein. The entire intestinal tract was uniformly stained green, except for a 7.5 cm segment not stained at 10-15 sec. and 2.5-5 cm segment patchily stained at 25-30 sec. The dye did not diffuse across the anastomosis between ischemic and normal intestine. The 2-poorly stained segments were marked with stitches, the intestine returned to the abdomen, dogs sacrificed and autopsied at 24-48 hr. after operation. In Group 2 (12) a 30-35-cm loop of jejunum, with a good arcade, had 1 or 2 jejunal vessels ligated at 1 end and was divided at this point; 20 mg/kg dye was inj. i.v. The intestine stained immediately, with the degree of staining varying. The ischemic end of the intestine was left alone or resected: in 4, anastomosis was performed in an area of patchy staining; in 4, in an area without dye; in 4, in an area of complete staining. Abdomens were closed, dogs killed as above. In Group 1, all the control anastomoses with an intact blood supply were intact. Anastomoses made with non-stained intestine all broke down, and suture-marked ischemic segments became black and necrotic. Patchily stained segments were all viable, although they appeared more congested than normal intestine and had petechial hemorrhages on the serosal surface. In Group 2, all anastomoses with uniformly stained intestine remained intact. Three with patchily stained intestine remained intact, 1 broke down. All 4 with non-stained intestine broke down, with sloughing of ischemic segment. The use of alpha zurine 2G dye to differentiate between normal and ischemic intestine is recommended in intestinal transplants.

7120

FREEZING AND PRESERVATION OF THE INTESTINE OF THE RAT FOR LONG PERIODS AT THE TEMPERATURES OF LIQUID NITROGEN. (Fr.)

Eygonnet, J. P. (Julliard Ctr., Clamart, France) Agressologie 8(1):83-87, 1967.

Adult rats (260-480 g) were killed by ether or bleeding and the duodenum or jejuno-ileum excise and placed in Tyrode's soln. at 37.5°C; the intestinal segments were then plunged into a 10% by vol. soln. of dimethylsulfoxide in Tyrode's which had been maintained at 37.5°C. The freezing was done after variable periods of incubation in the sulfoxide fluid (10, 20, 30, and 45 min.) according to 2 methods. Slow method: The segment was placed within the finge of a surgical glove; the segment was frozen at 80°C in the presence of 3 ml of soln. This temperature was obtained in a freon refrigerator the final temperature was -64°C. The rapidity of the temperature drop was 1°C/min. The ultrarapid method: The intestinal segment was frozen in a few sec. by direct immersion in a bath of liquid nitrogen. The defrosting was also done by 2 different technics. Semirapid defrosting: The tissue which had been slowly frozen was placed, still in the finger of the glove, in a water bath at 45°C. The duration of the storage at -64°C should not exceed 24 hr. Ultrarapid defrosting: The tissues rapidly frozen were maintained in liquid nitrogen or in the vapors from liquid nitrogen at -160°C for variable periods 1 hr.-8 wk. The defrosting was done in less than a min. The piece of intestine was placed in 100 ml of Tyrode's soln. in a thermostatted water bath. Sometimes 0.25 or 0.50 mg of $CuSO_4$ or 2-3 mg $BaCl_2$ were required to stimula the tissue. A latent period of 15-20 min. occurr before the tissue began automatic rhythmicity.

7121

ILEUS CAUSED BY ACENOCOUMARIN. (Dut.)

Deboer, H. H. M. (South Hosp., Rotterda Netherlands). Nederl. T. Geneesk. 111(15):675-678, 1967.

Four cases are reported of vascular complications arising from anticoagulant therapy using acenocoumarin for periods from 12 days-2 yr. for arteriosclerotic changes in leg arteries, prophylaxis after operation, thromboses, and heart infarction with atrial fibrillation; 2 cases were treated by surgery following obstruction in the jejunum and ileum in 1 and obstruction of the jejunum in the other; 2 cases, treated conservatively, had apparent obstruction of the small intestine. Prothrombin time was 60 sec. in 1 patient and more than 2 min. in the other 3; hemoglobin was 6.6 and 8 g% in 2 who had hematuria, and 13 and 16 g% in 2 who had s.c. hepatomas. All received vitamin K_1; 2 had blood transfusions, 1 plasma transfusion, and 1 rheomacrodextran and blood transfusion. In the small intestines of the operated patients, bleeding had occurred into the submucosa and in the subserosa. Characteristic symptoms were pain in

umbilical region, vomiting and distention of
abdomen. Recoveries were uneventful.

2 THE INFLUENCE OF GLUCOCORTICOIDS ON
INTESTINAL MUCOSAL HEXOSEMONOPHOSPHATE
NT ENZYMES IN THE RAT. (E.) Pfeiffer, C. J.
:. Aeronaut. Space Admin., Moffett Field,
f.) and P. J. Muller. Arch. Int. Pharmacodyn.
2):258-272, 1967.

nal intact or healthy, bilaterally adrenalecto-
ed-hypophysectomized male Sprague-Dawley rats
given s.c. inj. of 4, 12 or 36 mg of hydro-
tisone acetate or corticosterone acetate/kg
wt./day for 3 days. At necropsy, adrenal
nds, testes and thymus glands were removed
weighed; the proximal 12-inch portion of
unum was also removed. As a means of estima-
g hexosemonophosphate shunt activity, glucose-
hosphate dehydrogenase and 6-phosphogluconate
ydrogenase activity were assayed in jejunal
ogenates of control and corticoid-treated rats
spectrophotometric determination of reduced
otinamide adenine dinucleotide phosphate
nation. Both steroids inhibited body wt. gain
ng/kg) or induced a wt. loss (36 mg/kg);
rocortisone was approx. twice as potent with
ard to this toxic effect in intact rats and
it was more potent in producing wt. reduc-
n in adrenalectomized-hypophysectomized rats.
ever, the highest dose of either glucocorticoid
in. to either group of rats did not induce a
loss comparable to that caused by 3 days of
ting. Both steroids, especially hydrocortisone,
sed a reduction of absolute and relative
enal wt., absolute testicular wt. and an
olution of the thymus gland. Hydrocortisone
uced a significant inhibitory, log-dose (4-36
kg/day; 3 days) response in both mucosal
ymes in both groups of rats. Similar dose
els of corticosterone also inhibited jejunal,
osal glucose-6-phosphate dehydrogenase and
hosphogluconate dehydrogenase in both groups
rats; in intact rats, the highest dose of
ticosterone used (36 mg/kg) completely in-
ivated both enzymes. In adrenalectomized-
ophysectomized rats, the intermediate dose
mg/kg) gave less suppression than the lowest
e (4 mg/kg). Hydrocortisone was more active
stress-related changes in body, adrenal, thymic
testicular wt. It is suggested that mucosal
ceptibility to glucocorticoids may be related to
aired carbohydrate metabolism in the intestinal
osemonophosphate shunt.

3 CHANGES IN INTERNAL ENVIRONMENT IN
INTESTINAL STRANGULATION AND ITS
ATMENT. (Sp.) Silva, C. (Fac. Med., Montevideo,
guay). An. Fac. Med. Montev. 50(3/4):321-
, 1966.

eview of pre- and postoperative treatment of
ients with intestinal strangulation emphasizes
extremely high fluid loss and loss of
ctrolytes, together with replacement technics.
Three illustrative case histories are cited. The review is supplemented by report of the induction of an experimentally strangulated loop in 8 dogs with survival times ranging from 10-37 hr. Fluid losses at the level of the strangulated loop ranged from 28.7-64.8% (mean = 48.6%) total plasma vol. Among 81 patients who were hospitalized for strangulation during an 18-yr. period, the overall mortality rate was 24.6%. However, among 27 of 81 in whom irreversible lesions (e.g., hemorrhagic infarct) had occurred, necessitating resection, mortality rate was 58%. There was no significant sex difference, but age appeared to be a factor in survival. Although only 45 of 81 (55%) in the patient group as a whole were over 60 yr. of age, 15 of 20 (75%) of the decreased were over 60.

7124 CAUSE AND TREATMENT OF DIARRHEA FOLLOWING RESECTION OF THE SMALL INTESTINE. (E.) LeVeen, H. H. (VA Hosp., Brooklyn, N. Y.), B. Borek, D. R. Axelrod and A. Johnson. Surg. Gynec. Obstet. 124(4):766-770, 1967.

A bypass of the small intestine was created in 4 obese patients by anastomosing the end of the proximal portion of the jejunum to the side of the terminal portion of the ileum, creating a loop which was as short as possible; less than 18 inches of small intestine remained in all patients. A similar resection was performed on 1 patient for mesenteric occlusion. Two ounces of castor oil (a triglyceride of ricinoleic acid, the latter differing from oleic acid only by the presence of an hydroxyl group on carbon number 12) were admin. to normal subjects; almost all of it appeared in the stool as free ricinoleic acid or its soap and less than 20% remained in the form of neutral fat. In a 3-day period, 92 g/day of neutral fat were fed to patients both before and after bypass, and the stool was analyzed. Preoperatively, almost all of the fat was absorbed; postoperatively, the fat was almost completely excreted, but as fatty acid or soap rather than neutral fat. A similarity was found to exist between normals who excreted ricinoleate after ingestion of castor oil, and those with a bypass who excreted fatty acids and soaps after ingestion of neutral fats. The chemical cause of diarrhea was therefore postulated to be failure to absorb fatty acids during fat digestion. When 20.5 g of $CaCO_3$ were simultaneously admin. with castor oil, 4 of 5 normal subjects had solid stools while the fifth had a pasty stool without diarrhea. Admin. of as much as 20 g of $CaCO_3$ to patients with an intestinal bypass rendered their stools pasty or solid, eliminating explosive excoriating diarrhea. It is concluded that precipitation of fatty acids with $CaCO_3$ is an important part of management after bypass or resection of the small intestine.

7125 TUMORS OF THE SMALL INTESTINE. REPORT OF 65 CASES. (Por.) Rosenberg, D.

(U. Sao Paulo, Brazil), J. Pan Chacon, P. A. J. Faria, F. de Camargo Vianna, A. M. Cardoso de Almeida, J. A. de Mello Saraiva. Rev. Ass. Med. Brasil. 12(3):111-118, 1966.

Among 65 patients with tumors of the small intestine, 52 had malignant, 13 had benign tumors. Diagnosis, established by surgery, could not be confirmed by X-ray in one-half to two-thirds the patient group. There were no significant sex differences with respect to the frequency of incidence of either type of tumor. Duodenal tumors included 3 carcinomas, 1 sarcoma, 2 benign; comparable tabulations for the jejunum were 5, 6 and 5, resp.; for the ileum they were 5, 14 and 1, resp.; for patients in whom the segment of the small intestine was not defined they were 4, 12 and 5, resp. Also seen were 2 carcinoid tumors of the small intestine. Sarcomas and benign tumors showed an equal frequency of incidence in patients below and above 30 yr. of age. There were no carcinomas in patients under 30. The most frequent presenting symptoms were those of partial or total obstruction. Results of surgery were good in the presence of benign tumors, poor in the presence of malignancies.

7126 CELIAC STEAL SYNDROME: POSSIBLE CAUSE OF INTESTINAL ANGINA. (E.) Stewart, H. R. (Methodist Hosp., Lubbock, Texas). Texas Med. 63(5):63-68, 1967.

7127 RAPID FLUOROSCOPIC DUODENAL INTUBATION. (E.) Gianturco, C. (Carle Clin., Urbana, Ill.). Radiology 88(6):1165-1166, 1967.

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7137 INTESTINAL EPITHELIAL ENZYME ABNORMALI TIES INDUCED BY 5-FLUOROURACIL: TRANS LOCATION OF NADPH2-DEHYDROGENASE. (E.) Kaufmann, H. J. (Yale U. Sch. Med., New Haven, Conn.), H. M. Spiro and M. H. Floch. Amer. J. Dig. Dis. 12(6):598-606, 1967.

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7150 SURGICAL MANAGEMENT OF LARGE FISTULA OF CECUM OR OF THE TERMINAL SEGMENT OF THE ILEUM. (Pol.) Perzyna, T. (1st Surg. Clin., Poznan, Poland) and J. Zawilski. Pol. Przegl. Chir. 39(4):307-311, 1967.

7151 PROBLEMS IN DIFFERENTIAL DIAGNOSIS OF MECHANICAL ILEUS. (Ger.) Kalligiannis, O. (U. Clin. Frankfurt/M., Germany). Zbl. Chir. 92(20):692-695, 1967.

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7153 DIAGNOSIS AND THERAPY OF BILE STONE ILEUS. (Ger.) Stucke, K. (U. Clin., Wurzburg, Germany). Materia Med. Nordmark 19(5): 267-272, 1967.

7154 INTESTINAL LYMPHOSARCOMA. (E.) Welborn, J. K. (Henry Ford Hosp., Detroit, Mich.), J. W. Rebuck and J. L. Ponka. Arch. Surg. (Chicago) 94(5):717-723, 1967.

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7156 MOTOR DIARRHEA DUE TO MEDULLARY THYROID CARCINOMA. A NEW ANATOMIC AND CLINICAL ENTITY. (Fr.) Bernier, J. J. (St. Lazare Hosp., Paris), M. Bouvry, D. Cattan and A. Prost. Presse Med. 75(12):593-595, 1967.

7157 LEIOMYOSARCOMA OF THE SMALL INTESTINE. (Ger.) Laube, J. (Annaberg Hosp., Germany) and G. Weise. Zbl. Chir. 92(18):637-640, 1967.

See also abstract nos.: 6643,6644,6645,6648,6678,6702,6713,6746,6750,6844,7335

7158 NEWLY DETECTED PULMONARY TUBERCULOSIS AND PEPTIC ULCER.

(Cz.) Musil, J. (Palacky U., Olomouc, Czechoslovakia). Rozhl. Tuberk. 27(1):21-23, 1967.

Of 1496 patients with newly detected, active pulmonary tuberculosis, admitted to the University Hospital in Olomouc during 1954-1965, 162 presented with gastroduodenal ulcer. Although the absolute number of persons admitted with tuberculosis decreased gradually during these 12 years, the porportion of those with ulcer complication increased from about 6 to 18%. The incidence of tuberculosis in persons with peptic ulcer is about 9 times higher than in the whole population of Czechoslovakia. The time interval between the appearance of the symptoms of the ulcer and those of tuberculosis was 10-11 yr., regardless of whether the ulcer was removed by surgery or not. The authors recommend improved preventive measures for early detection of tuberculosis in the fraction of population (about 2%) suffering from peptic ulcer.

7159 ACTION OF SUPERANABOLON R SPOFA (NANDROLONPHENYLPROPIONATE) ON THE DEVELOPMENT OF EXPERIMENTAL GASTRIC LESIONS.

(Cz.) Korbová, L. (Charles U., Prague), Z. Pokorný, J. Kohout and M. Procházková. Cas. Lek. Cesk. 105(49-50):1349-1352, 1966.

The effect of Superanabolon (beta-phenylpropionate-19-nortestosterone) on the development of experimental gastric lesions in Wistar rats, induced by immobilization of the animals, was investigated. In one set of experiments groups of rats were inoc. i.m. 24 and 0 hr. before immobilization by 0.5, 5, 25, and 50 mg of Superanabolon, resp., per kg wt. and daily. In another series, Superanabolon was admin. in amounts of 5 and 25 mg, resp., per day and kg wt. during the last 6 days before immobilization. In control groups the animals were either immobilized without treatment or without immobilization treated with Superanabolon in similar ways as in experimental groups. During immobilization the rats were not fed, but they received s.c. 5 ml of physiological saline. After 22 hr. of immobilization the rats were killed, their stomachs removed, and the lesions of the gastric mucosa evaluated. In rats which received 0.5 or 5 mg/kg of Superanabolon during the 2 days before immobilization, the number and the size of lesions was reduced by 43 and 23%, resp. However, when higher doses of Superanabolon (25 or 50 mg/kg wt. and day) were admin. under similar conditions, the extent of the damage to the gastric mucosa was by 29% higher than in untreated, immobilized rats. Similarly, the number and size of lesions increased by 60%, when the animals received 5 or 25 mg/kg of Superanabolon during the last 6 days before immobilization. Rats which were not immobilized, but treated with comparable doses of Superanabolo did not develop gastric lesions.

7160 HYPERSENSITIVITY OF THE GASTRIC MUCOSA OF THE RAT TO REPEATED ADMINISTRATION OF BISMUTH SUBNITRATE.

(Fr.) Huyen, V. N. (Joullie Res. Lab. Serv., Hauts-de-Seine, France) and S. Garcet. Sem. Ther. 43(1):34-37, 1967.

In rats treated for 10 days with bismuth subnitra (total 1 g/kg), no macroscopic changes were noted in the prepyloric area of the stomach, but histological studies showed mucosal abrasion with exposure of the glandular elements, epithelial desquamation with cellular lysis, inflammatory edema and signs of hypersecretion of mucus. In rabbits treated with the same dose of bismuth subnitrate, no gross or microscopic changes were noted in the stomach; it is concluded that the rabbit stomach is similar to the human stomach in this respect.

7161 THE FREQUENCY OF DIFFERENT BLOOD GROUPS IN GASTRODUODENAL ULCER.

(Rus.) Gheller, L. I. (Khabarovsk Med. Inst., USSR), E. A. Svetacheva and E. P. Il'enko. Ter. Arkh. 38(11):35-36, 1966.

The frequency of various blood groups was analyze in 2021 patients with gastroduodenal ulcer and compared with data from 3906 healthy donors. The was no statistically significant difference found either in men or in women with gastric and duodenal localization of the ulcer. It is concluded that data in the literature on the relativ predominance of blood group 0 in gastroduodenal ulcer is not justified.

7162 CURLING'S ULCER.

(Fr.) Nasilowski, W. S. (Inst. Hematol., Warsaw, Poland). Acta Chir. Belg. 65(7):772-773, 1966.

Over a period of 14 yr. 981 adult patients were hospitalized for treatment of burns of whom 110 died as a consequence; autopsy of 95 cases revealed the presence of gastroduodenal ulcers (Curling's ulcers) varying between 5-18 mm in 6 cases (3 males and 3 females; ages 20-71 yr.). The ulcer was located in the duodenum in 5 cases and in the ventricle in 1 case. The ulceration was multiple in 2 cases and complicated by fatal massive hemorrhage in 1 case and by diffuse peritoneal perforation in 2 cases. All cases involved third- or fourth-degree burns which were due to fire in 5 cases and electricity in 1. In only one case (aside from those with obvious complications) was the ulcer diagnosed. In fact, 2 cases were receiving ACTH treatment for the burns which probably enhanced the development of the Curling's ulcer, as histologically the ulcers resembled acute ulcers often seen with corticosteroid treatment: lack of a transition zone between the oozing substance and the mucosa, lack

peripheral induration and similarity in
e. Curling's ulcers might appear after the
st several wk. and this possibility must
ays be considered, especially when treatment
h ACTH or corticoids is decided upon.

3 HEMORRHAGES·OF CIRRHOTICS WITH ULCERS.
(Fr.) Dupuy, R. (Beaujon Hosp.,
is) and J. Marteau. Rev. Prat. 17(6):715-725,
7.

-to-side portacaval anastomoses were
formed at the same time as 2/3 gastrectomies
4 cirrhotic patients suffering from bleeding
ers. Of these 4 cases, 3 were considered
cesses, 1 surviving after 2 mo., another
er a yr. and, the third, after 2.5 yr. The
rth patient died 2 mo. after the intervention,
bably because of transfusion hepatitis. Two
er failures are mentioned upon whom double,
plete vagotomies, as well as the above-
tioned surgery were performed. However, these
es were complicated by ascites and encephalo-
hic difficulties. Numerous complications of
combined pathology of cirrhosis and ulcers
discussed in detail: of 9 cirrhotic patients
n with ulcers, only 2 presented a typical
er syndrome. Two others presented with pseudo-
iary symptomatology, two with pseudogastric
rtburn and three were without symptoms. Yet,
tric ulcer is the second most common cause of
th among cirrhotic patients. Prognosis was
rer in those patients with jaundice, ascites,
betes, anemia, hyposiderinemia and multiple
ers. Only when portal hypertension was not
sent and the ulcer condition seemed mild, was
ical treatment effective, which included
muth, aluminum gels, polysilane, i.v. vitamin
nd protein therapy.

4 GASTRIC ULCER AND ANTRAL BORDER. (E.)
Ruding, R. Surgery 61(4):495-497,
7.

exact location of the gastric ulcer was
ermined in a sequence of 80 resected specimens;
were located in the antrum, 34 on the boundary
ween fundus and antrum. None were found in the
dus gland region. It is thought that a fairly
ge percentage of the 46 antral ulcers were
uated near the antral border. It is further
othesized that ulcer development is dependent
n the coincidence of 2 factors, e.g., exposure
the mucosa to HCl and its sensitivity to this
d. The sequence of sensitivities to HCl by
cosa is thought to be highest in esophagus,
lowed in order by duodenum, antrum and fundus
ere sensitivity is negligible). The significance
these findings is discussed, and it is stated
t antral resection in the treatment of ulcers
olves removal of that part of the stomach that
duces gastrin as well as the portion most
ely to produce ulcers.

7165 THE CHANGE OF BOWEL HABITS FOLLOWING VAGOTOMY AND PYLOROPLASTY. (E.)
Barnes, A. D. (U. Birmingham, England) and J. A. Williams. Brit. J. Surg. 54(3):218-220, 1967.

Subjects were 92 consecutive duodenal ulcer patients treated by truncal vagotomy and Weinberg pyloroplasty over 4 yr., with 1.5-4.5 yr. follow-up. Thirty-one showed no change in bowel habits. Of the 61 who changed, 46 were pleased that they were cured of constipation; 11 displeased; 4 made no reply. Of the 11, 1 claimed increased constipation, 10 troublesome diarrhea. In all, 62 reported diarrhea at some time during follow-up; an av. of 25% reported diarrhea during each postoperative yr. Early diarrhea was more often associated with gastric retention than with later bowel disturbance. All 10 with troublesome diarrhea had first symptoms in first yr., 7 in the first mo. To these were added 7 from other surgeons with the same symptoms, and all were studied for 3 mo. Patients were given 1 of 3 tablets to be taken 3 times daily for 3 days for diarrhea: codeine phosphate 15 mg; diphenoxylate HCl 5 mg and atropine sulfate 0.05 mg; an inert placebo. During study, only 6 of 10 had diarrhea. Only 2 ever had more than 3 stools daily (1 of whom had chronic pancreatitis preoperatively). Four had troublesome diarrhea, but never more than 3 stools daily. These received no benefit from codeine or diphenoxylate and atropine, although those who pass more than 3 stools daily are benefited equally by either. Placebo subjects continued in a course characteristic of untreated, severe, postvagotomy diarrhea.

7166 VAGOTOMY IN THE RAT. A STUDY OF ITS EFFECTS ON STOMACH AND SMALL INTESTINE.
(E.) Ellis, H. (Westminster Hosp., London) and J. Pryse-Davies. Brit. J. Exp. Path. 48(2):136-141, 1967.

Studies on abdominal vagotomy, uncomplicated by gastric drainage, in adult and immature albino male Wistar rats are reported. Morphological and histological observations of stomachs of 50 adults were made 12-32 wk. after vagotomy. Of these 13 (26%) had stomachs of normal size, mean wt. with contents 8.8 g; 20 (40%) had dilated stomachs but with normal mucosal appearance, mean wt. of 25 g; 17 (=34%) had dilated stomachs showing gastric ulceration, mean wt. 26.5 g. Cineradioautography and microdissection supported the hypothesis that nondilated stomachs probably represented incomplete vagotomy. Ulcers of all grades were observed, were usually solitary, and occurred in the lesser curvature, never the rumen or antrum. There was no relation between the histological extent of the ulceration and the time elapsed since vagotomy (1-32 wk.). Including 10 controls, 24 (=40%) of 60 rats, in whom vagotomy appeared to be complete, developed gastric ulceration. None of the animals with undilated stomach showed dilatation of the esophagus, whereas 3 with dilated stomachs did. No significant differences were noticed in small intestines of vagotomized rats from those of controls, who were only laparotomized. Vagotomy had no effect on wt. gain or on general growth of the rats. Studies on distribution of enzymes in the stomach and small intestine are also reported.

7167 WEIGHT BEHAVIOUR AFTER OPERATION FOR DUODENAL ULCER. (E.)

Small, W. P. (Western Gen. Hosp., Edinburgh, Scotland), C. W. A. Falconer, A. N. Smith and J. Bruce. J. Roy. Coll. Surg. Edinb. 12(2):133-138, 1967.

A study is reported on the wt. behavior of 538 duodenal ulcer patients treated more than 5 yr. previously by either Polya gastrectomy (subtotal resection with removal of 2/3 of stomach) or vagotomy (subdiaphragmatic and unselective) and gastroenterostomy (no-loop, isoperistaltic, retrocolic anastomosis). At the time of this study, 29% of the patients were thin (defined after Kemsley), while 49% were thin at the time of operation and 72% gained wt. after operation, so that in this group operation was usually followed by a wt. gain. Since the patient for gastric surgery already has an ulcer, he is not healthy and his wt. at this time is not valid. Comparison should be made with wt. before illness. Postoperative wt. gain usually did not compensate for preoperative loss. In most patients, operation led to an enhanced state of nourishment, but not restoration of lost wt. The constitutionally thin patient should not be denied surgical treatment solely because he is thin. The choice of operative procedure need not be predicated in terms of wt. response as there is no significant difference.

7168 STOMACH DRAINAGE AFTER VAGOTOMY AND PYLOROPLASTY. (E.)

Barnes, A. D. (Gen. Hosp., Birmingham, England) and J. A. Williams. Amer. J. Surg. 113(4):494-497, 1967.

In 108 consecutive patients with duodenal ulcer treated with truncal vagotomy and pyloroplasty even if the duodenum was scarred, edematous, or the site of recent perforation, the incidence of postoperative gastric retention in 73 patients without stenosis was 10%. Of 55 patients with ulceration of 10-45 yr. duration, 5 had retention. Of 49 with less than 10 yr. history of ulceration, 6 had postoperative ulceration. The age range of the series was 16-78 yr. The age range of the patients with retention was 21-63 yr. There was no sex variation. The incidence of retention decreased during the 4 yr. of the study. When the series was begun, none of the surgeons involved had much experience with vagotomy and pyloroplasty. During the final 2 yr. of the study the only patient having prolonged retention was operated on by a surgeon performing his first pyloroplasty. Of patients with nasogastric drainage 71% had infection of chest (signs in chest with temperatures above 99° F) or wounc Of those with gastrostomy, 96% experienced infection, and 43% with no tube had infection. The high incidence in the second group was believed due to the selection of this procedure for patients with chronic bronchitis.

7169 GASTRODUODENAL ULCER AND PERIPHERAL ARTERIOPATHIES: CLINICAL AND PATHOGENETIC STATISTICAL FINDINGS. (It.)

Tajana, A. (U. Milan, Italy) and B. Doldi S. Arch. Ital. Chir. 92(5):676-685, 1966.

Among a group of patients with arterial obstruct 58 of 513 were also found to be suffering from gastric or duodenal ulcer. The male:female rati among the ulcer patients was 57:1; among all tho with arterial obstruction, it was approx. 19:1. There was no apparent relationship between the site of obstruction and the occurrence of ulcer. Gastric symptoms had appeared first, in all case Among 9 of 58, aged less than 40 yr., the mean interval was 7 yr. (range = 2-17 yr.); among 33 of 58, aged 40-60 yr., the mean interval was 12 yr. (range = 1-34 yr.); among 16 of 58, aged more than 60 yr., the mean interval was 16 yr. (range = 1-40 yr.).

7170 EXPERIMENTAL ULCEROGENIC ACTIVITY OF VARIOUS CORTICOSTEROIDS. (It.)

Tursi, A. (U. Bari, Italy), V. Liso and N. V. Grimaldi. Reumatismo 18(6):517-532, 1966.

A mean ulcer index (representing the mean number of ulcers induced, the av. degree of severity, and the percentage incidence of ulceration) was employed to compare 24 groups of female white rats, weighing approx. 150 g at the start of the experiment and subjected to various courses of treatment with corticosteroids as follows (all for 5 days): dexamethasone (2 mg/day p.o.) = 19. triamcinolone (8 mg/day, p.o.) = 17.8; ACTH (10 mg/day, i.m.) = 16.1; prednisone (10 mg/day, p.o.) = 14.8; prednisone with gastric buffer (same dose) = 14.2; 16-β-methyl prednisolone (8 mg/day, p.o.) = 14.1; 6-α-methyl prednisolone (10 mg/day x 5, p.o.) = 14.0; depot ACTH (10 mg/ day, i.m.) = 13.9; 6-α-methyl prednisolone acetat (10 mg/day, i.m.) = 12.9; paramethasone (4 mg/day, p.o.) = 11.1; 6-α-fluoroprednisolone (4 mg/day, p.o.) = 11.0; prednisolone (10 mg/day, i.m.) = 9.0. When the same drugs were admin. for the same length of time but at 10% the dose levels indicated, comparable tabulations were 12.1, 10.8, 8.2, 8.0, 8.2, 8.4, 8.3, 7.9, 7.2, 6.2, 5.8 and 5.1, resp. In a corollary study, rats receiving prednisone, 10 mg/day for 5 days, p.o., had a mean ulcer index of 12.5, while rats receiving prednisolone in the same dosage, i.m., had an index of 8.5. It is concluded that parenteral admin. of corticosteroids tends to lessen their ulcerogenic potential and that this tendency is most marked in those which have a fluorine atom in the C_6 position. It is noted

the ulcers induced in rats differed from
n peptic ulcers in a number of ways, including
absence of inflammatory and regenerative-
tive processes.

GEL-INFILTRATION PURIFICATION OF A
PROTEIN FACTOR (UROGASTRONE) FOUND IN
URINE OF PREGNANT WOMEN AND INHIBITS GASTRIC
ETION AND GASTRIC ULCERATION. (It.) Lugaro,
U. Milan, Italy). Farmaco (Prat.) 21(11):
595, 1966.

thod is described for purifying urogastrone
iltration of Sephadex gels, yielding a
ogically active, final fraction (Ug G-100)
n represents approx. one-third the wt. of
original material but retains approx. 100%
oth its antisecretory and antiulcerative
vities. The fraction has no antigonadotropic
vity, whose presence in previous endproducts
ow thought to have been due to impurities,
no activity similar to that of the follicular
ulating hormone.

CLINICAL AND STATISTICAL CONSIDERATIONS
IN THE TREATMENT OF PERFORATIONS OF
RODUODENAL ULCERS. (It.) Ciuffini, F.
Perugia, Italy) and B. Tristaino. Acta Chir.
. 22(5):443-458, 1966.

g 58 men and 1 woman, presenting with
orated gastroduodenal ulcers, the age range
16-85 yr. (mean = 38 yr.), with 16.9% of
cases occurring in the third decade of life,
% in the fourth, 13.59% in the fifth and
5% and 10.1% in the sixth and seventh, resp.
half the group gave a history of typical
roduodenal ulcer symptoms. In 44 of 58, a
le ulcer was found in the first segment of
duodenum; in 5, two ulcerations were found
e; in 1, a single ulcer was found in the
nd segment; in 9, the ulcer was gastric.
of the patients were bleeding. In 3 of 59,
ery was confined to repair of the perfora-
in 1 of 3, because of cardiac and
ratory insufficiencies; in 2 of 3, both
hom died, because of disseminated peritonitis,
nd 50 hr., resp., after perforation. There
no mortalities among the 56 patients
ning, all treated by traditional gastro-
enal resection. Postoperative complications
limited to 10 cases of transient gastric
s, 6 of diarrhea, 2 of transient jaundice.
other patients had postoperative difficulties
related to surgery or the presenting disorder.
ollow-up, 1-5 yr. later, 2 of 56 had
rienced mild wt. loss, 2 reported postcibal
rome, 9 showed mild anemia and complained
arrhea. There had been no recurrences at
time of report. It is concluded that
tional gastroduodenal resection is still
therapy of choice in the treatment of gastro-
enal ulcer.

7173 EFFECT OF PARATHYROID HORMONE (PTH) ON ULCER INDUCED BY LIGATION OF THE PYLORUS. (It.) Foresti, A. (U. Messina, Italy) and A. Buda. Boll. Soc. Ital. Biol. Sper. 42(17):1088-1090, 1966.

In adult, male albino rats bearing Shay ligatures of the pylorus, pretreatment with parathyroid hormone, 0.12 Collip U/kg/day for 5 days, i.m., prior to induction of the ligature, gave approx. 60% protection against the induction of gastric ulcer. Massive ulcerations were developed by 3 of 11, as compared to 4 of 6 controls; small ulcers by 2 of 11, as compared to 2 of 6 controls. The effect was attributed to the hormone's ability to activate Ca at the level of the cellular membrane.

7174 VARIATIONS OF SERUM HISTAMINE-BINDING CAPACITY IN THE PRESENCE OF ULCERS INDUCED BY BUTAZOLIDINE. (EXPERIMENTAL STUDY.) (Fr.) Dascalakis, T. B. (Med. Clin., U. Athens, Greece), Z. Mamalis and C. Pratsica-Ougourloglou. Arch. Franc. Mal. Appar. Dig. 52(11):1033-1044, 1966.

In 5 of 5 dogs bearing gastric ulcers induced by butazolidine (75 mg/kg, i.m., single dose or in 2 equal doses, 24 hr. apart), serum histamine-binding activity was sharply reduced within 48 hr. (from 1:640-1:160) and was virtually totally suppressed (1:10) within 72 hr. The phenomenon did not reverse itself prior to death or sacrifice (max. observation time: 144 hr.). In 4 of 4 dogs in which the same treatment induced only gastroduodenal erosions, histamine-binding activity was still normal (1:640) at 48 hr., fell to 1:320 at 72 hr., then stabilized at 1:160, without subsequent reversal, at 96 hr. In 1 animal which developed hemorrhagic gastritis without ulceration, it was normal at 48 hr., 1:320 at 72 hr., normalized again by the 96th hr. No antihistamine-binding effect was exerted by the drug on 2 additional animals, which failed to develop any lesion. Among a total of 19 animals treated with butazolidine (7 of 19 not included in the above for various reasons), 16 of 19 developed gastroduodenal lesions, accompanied in 8 of 16 by liver nodules characteristic of allergic response. Such nodules could not be demonstrated in any of the 3 of 19 animals (total) which were resistant to the drug.

7175 METABOLISM AND SURGICAL MANAGEMENT OF ULCER RESECTION. (Ger.) Bartsch, W. M. (U. Bonn, Germany), A. Gütgemann, H. W. Schreiber and J. Breuer. Langenbeck. Arch. Klin. Chir. 317(2):140-159, 1967.

Acid secretion of the gastric stump, gastric proteolysis, absorption of amino acids, and blood levels of protein and amino acid were determined in normal subjects and in subjects with Billroth I and Billroth II resections. The pH in the fasting stomach was determined at rest and after stimulation in 5 cases of Billroth I and 4 cases of Billroth II. No resting acid was produced in any of these and following histamine stimulation only in 1 case with a Billroth II resection; the acid was secreted at the rate of only 2 mEq/hr. for about 45 min. Gastric proteolysis was measured in a test drink admin. to 17 normal individuals, 12 with Billroth I and 9 with Billroth II. The hydrolysis was monitored over a period of 2 hr. The normal curve was approached by that of the Billroth I patients, whereas the Billroth II curve was much depressed. The amino acid conc. of the serum was determined by an autoanalyzer; 22 amino acids were determined in 4 normal individuals and in 10 with Billroth I constructions and in 10 with Billroth II. The fasting blood levels of these amino acids showed no significant differences in the 3 groups. Analyses of sera 2 hr. after a test meal revealed an increase in the serum conc. of all amino acids in the test meal with the exceptions of asparagine, histidine, lysine, serine, arginine and glycine in the subjects with Billroth I and Billroth II. No difference was found between these 2 groups. The normal, control subjects had 100% absorption of all amino acids. Further research should make clear if these disturbances produce changes in body proteins and their metabolism. Electrophoretic separation of plasma proteins of normal subjects and those with Billroth I and II show no difference in the electropherograms. The surgical management of gastric and duodenal ulcers leads to disturbances in capacity and in the motor and secretory regulatory mechanisms, inevitably causing functional disturbances. In order to minimize these effects a number of practical steps have been outlined: extirpation of the ulcer; partial resection of the antrum leaving an oral margin on the small curvature, whenever possible only pyloroplasty; only a bordering resection of the body of the stomach in the region of the greater curvature; bilateral, selective gastric vagotomy; gastroduodenostomy according to Schoemaker and especially when suitable with the modification of Von Haberer and Winkelbauer.

7176 THE FREQUENCY OF ACUTE PERFORATED PEPTIC ULCER IN DIFFERENT POPULATION GROUPS IN ISRAEL. (Heb.) Lazarus, S. (Tel-Hashomer Govt. Hosp., Israel) and M. Modan. Harefuah 72(4):155-157, 1967.

A survey of the incidence of acute perforated peptic ulcer was carried out in 1961 and a total of 354 cases was found. All records for the years 1953-1958 were obtained from 10 hospitals, comprising 70% of the surgical beds available in Israel. The mean annual crude incidence per 100,000 population at risk was as follows: In the Jewish population, 13.9 ± 1.0 (191 cases) for European-born males, 1.5 ± 0.3 (20 cases) for European-born females; 8.8 ± 1.0 (86 cases) for Asian and African-born males, 0.2 ± 0.2 (2 cases) for Asian- and African-born females. (The difference between the male/female ratios of the two ethnic groups was significant. In b groups, the difference in incidence between mal and females was significant.) Also, 1.5 ± 0.4 (17 cases) for Israel-born males, and 0.1 ± 0. (1 case) for Israeli-born females. In Arabs a Druze, the rate was 1.4 ± 0.6 (6 cases) in male and 0.3 ± 0.3 (2 cases) in females. It was de strated that the apparent differences between the European-born, Asian-African-born, and probably also Israeli-born are due to differen in age distribution only. Rates among Yemenit as well as the Arab and Druze populations appe to be lower than in other groups, perhaps due a higher rate of deaths at home. The rates in females differ significantly from those in mal in all population groups. The small numbers involved prevented the establishing of reasons for the differences in incidence in females in the various populations. The mortality rate a the time of hospitalization was similar in bot European- and Asian-African-born males. In bo groups the mortality rate was substantially higher after the age of 60.

7177 RELATION BETWEEN MAXIMAL ACID OUTPUT OF STOMACH AND LEAN BODY MASS. (E.) Hume, R. (Southern Gen. Hosp., Glasgow, Scotla and A. G. Melrose. Brit. Med. J. 2(5543):30-3 1967.

A study is reported which tried to resolve certain aspects of previous failure to establis a significant association between max. acid output and body build by measurements of height wt., and surface area in normal patients and u patients. Results showed a significant correl between max. acid output and lean body mass in both normal adults and duodenal ulcer patients. Normals were 3 males and 5 females, aged 20-51 (mean 28.4 yr.) with no dyspeptic symptoms or family history of ulcer. Ulcer subjects were males and 3 females, aged 16-65 (mean 41.5 yr.) each with a radiologically demonstrated ulcer. Max. acid output was determined by the augment histamine test meal of Kay. Lean body mass was calculated from height and wt. by the formula of Hume on the basis of the measurement of tot body mass. A high correlation between the 2 parameters was observed. Ulcer patients showe a much wider scatter in acid output, but the correlation between the parameters was still significant. The max. acid output/kg lean body mass of the ulcer group (0.6 ± 0.2) was significantly greater than that for normals (0.3 ± 0.1).

7178 PSYCHOSOMATIC EFFECTS IN OPERATED ULCER PATIENTS. (Ger.) Zauner, J. (Lower Saxony Tiefenbrunn bei Gottingen Hosp., Germany). Z. Psychosom. Med. 13(1):24-30, 1967

After ulcer operation 87 patients suffered

chosomatic symptoms; 70 were separated into
roups on the basic of postoperation intervals
n complaints were made. The symptoms in
eral were similar in the 3 groups; the third
up showed more intense syndromes than the
er two. The complaints in general were
austion, deep depression, feelings of
dequacy, insecurity, increased excitability
n trembling, diminished sexual desire, and
otence. Vertebral column syndrome and
oulsive neurotic tendencies occurred in some
ients; in addition some became alcoholic or
ituated to analgesics; 3 showed suicidal
dencies; 3 patients exhibited agorophobia.
haracteristic complaint was the sense of
s of ability to implement plans; 1 patient
eloped priapism (contrary to the general
dition) and 1 patient showed cardiac
ptoms when under stress. In Group 1 (26
ients), the symptoms appeared immediately
er operation and continued for long periods
time without any variation. Stomach symptoms
sisted in 20 cases. Group 2 (26 patients)
bited early and late periods of symptoms,
arated by a relatively complaint-free period
-5 yr. The early symptoms of 16 cases
cerned the stomach mainly; the remaining 10
wed various neuroses. During the late period
patients developed a new set of neuroses
uding agitation, depression, impotence, etc.
up 3 cases (18) did not suffer from early
ptoms; half the number did not develop
ptoms until after the first 5 postoperative
in all cases there was an interval of at
st 1 yr. prior to onset of symptoms. Stomach
n occurred in only 5; impotence was the chief
plaint. The different neuroses were evident
this group. The generally similar character-
cs exhibited by the patients in these 3
ups may arise (a) from pre-existing bases
ggered by gastric resection, (b) from the
ree of actual physical loss of stomach tissue,
from the loss of physiological function
ernate filling and emptying, decreased
retion and possible reflex activity), or (d)
e neuropathologic relationship between gastric
er and the observed neuroses.

HISTAMINE-INDUCED GASTRODUODENAL
ULCERATION. (E.) Watt, J. (U.
erpool, England). J. Indian Med. Prof.
2):6009-6012, 1967.

ANTACID AND ANTICHOLINERGIC DRUG
THERAPY OF PEPTIC ULCER. (E.)(Rev.)
er, D. W. (Roy. North Shore Hosp., Sydney,
ralia). Gastroenterology 52(6):1009-1018,

STUDY OF ULCERS OF THE PYLORIC CANAL.
CONCERNING 74 CASES. (Fr.) Bertrand,
. and J. Vincent. Arch. Mal. Appar. Dig.
):163-176, 1967.

2 PULMONARY ALVEOLAR LESIONS IN VAGOTO-
MIZED RATS. (E.) Goldenberg, V. E.
(Columbia Coll. Physicians, New York, N. Y.), S. Buckingham and S. C. Sommers. Lab. Invest. 16(5): 693-705, 1967.

7183 THE ROLE OF VAGOTOMY IN DUODENAL ULCER SURGERY. (E.) Bryant, W. M. (U. Kentucky Med. Ctr., Lexington), D. Klein and W. O. Griffen, Jr. Surgery 61(6):864-867, 1967.

7184 GASTRIC HYPOTHERMIA IN TREATMENT OF DUODENAL ULCER. (It.) Pistoni, F. F. (U. Rome). Riv. Gastroent. 18(4):201-236, 1966.

7185 ULCERS IN CHILDREN. (Rus.) Potanin, N. V. (Leningrad Pediat. Med. Inst., USSR). Pediatriia 46(5):46-50, 1967.

7186 IS VAGOTOMY PLUS ANTRECTOMY THE SUITABLE SURGICAL THERAPY OF DUODENAL ULCER? (Ger.) Kaiser, E. (Waid City Hosp., Zurich, Switzerland) and F. Deucher. Praxis 56(20):678-682, 1967.

7187 DIFFERENTIAL DIAGNOSIS OF POLYPOID LYMPH NODE HYPERPLASIAS IN CALLOUS GASTRIC ULCERS. (Ger.) Krause, F. W. (Friedrichshain City Hosp., Berlin) and F. Bilek. Bruns Beitr. Klin. Chem. 214(3):305-313, 1967.

7188 IMMEDIATE POSTOPERATIVE COMPLICATIONS AFTER SURGICAL TREATMENT OF ULCER DISEASE. (Nor.) Bruusgaard, C. (Ulleval Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):858-863, 1967.

7189 VAGOTOMY WITH PYLOROPLASTY AND VAGOTOMY WITH ANTRECTOMY IN THE TREATMENT OF PEPTIC ULCER. (Nor.) Semb, L. S. (Ulleval Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):856-858, 1967.

7190 VAGOTOMY AND GASTROJEJUNOSTOMY IN THE SURGICAL TREATMENT OF DUODENAL ULCER. (Nor.) Bruusgaard, C. (Ulleval Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):855-856, 1967.

7191 A GRADED GASTRECTOMY FOR DUODENAL ULCER. (Nor.) Fretheim, B. (State Hosp., Oslo), J. Myren and S. Gjeruldsen. T. Norsk. Laegeforen. 87(9b):853-854, 1967.

7192 GASTRECTOMY WITH BILLROTH I ANASTOMOSIS. (Nor.) Liavåg, I. (Ulleval Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):849-852, 1967.

7193 GASTRIC RESECTION WITH GASTROJEJUNOSTOMY. (Nor.)(Rev.) Holstad, H. A. (Sognsvn.

9 B, Oslo). T. Norsk. Laegeforen. 87(9b):845-848, 1967.

7194 ETIOLOGY OF PEPTIC ULCER AND ITS LOCALISATION. (E.) Zedtwitz, J. V. (Old Cottage, Leukerbad VS, Switzerland). Pp. 71-73 in Psychosomatic Medicine; Excerpta Med. Int. Cong. Ser. No. 134, Dunlop, E. and M. N. Weisman (Eds.). Amsterdam, Excerpta Medica Foundation, 1967, 273 Pp.

7195 PERFORATION OF AN ESOPHAGOGASTRIC ANASTOMOTIC ULCER INTO THE LEFT ATRIUM. CASE REPORT AND REVIEW OF THE LITERATURE. (E.) Prolla, J. C. (U. Chicago, Ill.), D. W. Taebel and J. B. Kirsner. Gastroenterology 52(5):871-874, 1967.

7196 PEPTIC ULCER IN YOUNGER AND OLDER CHILDREN. (Sp.) Lloret Perales, R (Fac. Med., Valencia, Spain) and J. Berenguer Lapuerta. Med. Espanola 55(327):364-383, 196

7197 WHEN TO HOSPITALIZE THE PEPTIC ULCE PATIENT. (E.) Roth, J. L. A. (U. Pennsylvania, Philadelphia). Hosp. Pract. 2(5):25-35, 1967.

7198 GASTRIC FREEZING AS TREATMENT FOR DUODENAL ULCER. (Ger.)(Rev.) Lind H. (German Red Cross Hosp., Hamburg, Germany) Materia Med. Nordmark 19(5):272-282, 1967.

See also abstract no.: 7641

9 HYPERTROPHIED PLASMA CELLS IN REGIONAL
ENTERITIS. (E.) Rippey, J. H. (New
land Deaconess Hosp., Boston, Mass.) and S. C.
ners. Amer. J. Dig. Dis. 12(5):465-467, 1967.

cimens obtained from 25 patients with regional
eritis, who underwent surgical resection,
e stained with phloxine methylene blue
examined for mast cells, 1000 leukocytes
connective-tissue cells being counted in
intestinal lamina propria of each. Plasma
ls were evaluated in the above and in
controls with colonic diverticulitis. Two
cks of involved intestine from each patient
e used, and 6 μ sections were stained with
atoxylin-eosin. Plasma cells (50/slide) were
ured in deeper portions of the intestinal
na propria. The area of each cell was
ulated. Biopsy specimens from those with
rative colitis and normal controls were used
tatistical analyses. Proportions of fibroblasts,
ts, monocytes, mast cells, lymphocytes, plasma
s, eosinophils, and neutrophils were: regional
ritis, 9.1%, 8.2%, 0.002%, 25.1%, 44.8%, 3.4%,
; ulcerative colitis, 23.6%, 4.8%, 3.1%,
%, 32.3%, 5.6%, 0%; controls, 29.2%, 4.8%,
, 34.2%, 21.5%, 6.9%, 0%. The smaller
er of fibroblasts in regional enteritis was
ly significant, the difference reflecting
edematous intestinal change characteristic
his disease. The increase in plasma cells
also significant. Plasma cells were significantly
ly larger (38.8-54.4 μ^2, av. 46.8) than those
olonic diverticulitis (29.2-40.0 μ^2, av.
). The IgA proteins in regional enteritis
under study to determine whether they
esent primary or secondary participation in
inflammatory reaction.

REGIONAL ENTERITIS IN JAPAN. A REVIEW
OF 548 CASES. (E.) Yamase, K.
tendo U. Sch. Med., Tokyo), K. Masuda, S.
ada and Y. Yamada. Int. Surg. 47(5):497-502,
.

his 15-yr. study, 548 cases are reported
males, 204 females, 37 unspecified), with
disease being found in the third, second,
th and fifth decades, in order of frequency,
with children and the elderly being much less
uently affected. This age distribution
llels that of acute appendicitis. About 70%
treated within 7 days of onset, 50% within
r. Complaints, also similar to appendicitis,
uded abdominal pain in the lower right quadrant (272), nausea and vomiting (191), alternating diarrhea and constipation (96), anorexia (99), diarrhea and/or melena (32). Signs, also similar to appendicitis, included ileocecal tenderness (321), palpable ileocecal mass (58), rigid rectus muscle (205), abdominal distention (123), fever (295). Very little laboratory and roentgenogram data was available. In 367 the lesion was in the terminal ileum, within 100 cm of the ileocecal valve; in 30 in the jejunum; never upward from the duodenum. Gross findings included edema, thickening and/or narrowing (326), hemorrhage, hyperemia and swelling (229), mass formation (35), mesenteric lymph node swelling (220), bowel wall necrosis (29), hepatomegaly (11), ulcer formation (13), perforation of bowel wall (16), intestinal obstruction (2), polypoid proliferation (13). Operations included resection of ileum (103), appendectomy (249), ileocecal resection (27), right hemicolectomy including terminal ileum (9), transverse ileocolostomy (14), exploratory laparotomy (9), closure of perforated lesion (5), drainage only (2). The majority of cases were acute, but the fulminant form (resulting in diffuse or localized peritonitis) was not rare. The acute form was clinically similar to acute appendicitis, accounting for the high frequency of appendectomies (247 of 548). Considering all types of operations, recurrence was rare and clinical course uneventful. Morbidity and mortality rates were favorable compared with those reported for other countries.

7201 GRANULOMATOUS DISEASES OF THE SMALL AND LARGE BOWEL. A HISTORICAL SURVEY. (E.)(Rev.) Crohn, B. B. (1000 Park Ave., New York, N. Y.). Gastroenterology 52(5):767-772, 1967.

7202 CONSIDERATION OF TWO CASES OF CROHN'S DISEASE WITH COLONIC LOCALIZATION. (It.) De Santis, U. (Rome). Ann. Ital. Chir. 43(1): 157-167, 1966.

7203 DUODENO-JEJUNAL LOCALIZATION OF REGIONAL ENTERITIS. (It.) Monti, G. F. (U. Rome), G. Cappellini, A. Leggeri and A. Thau. Policlinico [Chir.] 74(3):137-156, 1967.

7204 NECROTIZING ULCERATIVE ENTERITIS WITH MULTIPLE PERFORATIONS AFTER EXTENSIVE INTESTINAL RESECTION FOR INVAGINATION. (Ger.) Trommer, L. (Bergen Hosp., Germany). Z. Aerztl. Fortbild. 61(9):474-479, 1967.

7205 DISACCHARIDASE ACTIVITY OF THE JEJUNAL MUCOSA AMONG SUBJECTS WITH NORMAL AND RESECTED STOMACHS. (Ger.) Drube, H. C. (U. Clin., Kiel, Germany), H. T. Hansen, U. E. Klein and K. Zielke. Deutsch. Med. Wschr. 92(21): 960-963, 1967.

Normal subjects (28, Group 1) without any evidence of gastrointestinal disease, or indication of intolerance of milk or disaccharides, were biopsied under X-ray control; the specimens were obtained 10-30 cm distal to the duodeno-jejunal flexure. Jejunal tissue was obtained from 19 subjects (Group 2) undergoing gastric resection. Group 3 comprised 20 subjects with Billroth II resections of 1-42 yr. duration from whom biopsies were taken 20-40 cm distal to the anastomoses; 14 of these Group 3 persons showed a milk intolerance manifested in cramp-like pains after intake of 250-500 ml of milk, usually followed by diarrhea. Part of all specimens of tissue were used for histologic preparations and part for the determination of the conc. of the disaccharidases: maltase (M), saccharase (S), lactase (L) and cellobiase (C). The enzyme activity was expressed in units in relation to the protein content of the intestinal mucosa. Av. values for Group 1 were: M, 266.0 U; S, 98.4 U; L, 51.2 U; C, 14.5 U. L, S, and M in this group were related in activity as 1:2:5. The av. enzyme values for Group 2 were: M, 186.1 U; S, 69.6 U; L, 40.8 U; C, 9.7 U. Group 2 had lower disaccharidase levels than the subjects from whom samples were obtained by biopsy (Groups 1 and 3). The av. values for Group 3 were nearly those for Group 1. Activities for Group 3 were: M, 265.6 U; S, 98.6 U; L, 55.7 U; C, 14.0 U. Not only were the av. activities normal in Group 3, but the values were in the normal range for all except 1 individual in whom they were depressed. There was no relationship observed between the enzyme conc. and milk intolerance in 14 individuals. Blood sugar curves in 6 of these 5 subjects were normal after oral loading with L, M, galactose and glucose. The histologic examination of the jejunal biopsies in Group 3 disclosed that 10 subjects had a normal mucosa; 7 had a low-grade inflammation of the mucosa with slight infiltration of lymphocytes, monocytes and polymorphonuclear leukocytes in the mucosa and submucosa. These 7 had normal villi; 2 others had chronic jejunitis, and 1 case had severe jejunitis with atrophied villi; this last case was the one with depressed enzyme levels.

7206 OBSERVATIONS ON THE EFFECT OF PREDNISOLONE ON THE SMALL INTESTINE AFTER MILK CONSUMPTION. (Ger.) Schmidt, G. (1st U. Med. Clin., Berlin), G. Willamowski and K. Richter. Deutsch. Gesundh. 22(14):642-644, 1967.

Fasted patients (78) received 50 ml of $BaSO_4$ suspension through a radiopaque tube in the duodenojejunal flexure. X-ray pictures of the small intestine in relief were taken after 5 min.
Milk (100 ml) was introduced through the tube
15 min. later another 50-ml vol. of contrast
material; again after 5 min. X-ray pictures we
obtained. When definitely useful films of the
tests had resulted, the patients were inj. wit
25-50 mg prednisolone; 20-25 min. later contra
material was introduced and X-ray pictures tak
for the third time. Among these 78 patients,
had histories and clinical indications of milk
incompatibility; 34 of these showed normal sma
intestine structure; 5 had a coarse, swollen r
lief. After introduction of milk the caliber
jejunal folds enlarged in 37 cases; furthermor
crossfolds appeared in the previously normal p
tern. Simultaneously the gas and liquid conte
of the intestine increased. Disturbances of
tonus arose with numerous stretch-reflex contractions. For comparison, 30 patients of the
total group with indefinite upper abdominal
symptoms and no indication of milk incompatibi
and 9 others without intestinal or allergic di
orders had no visible changes after introducti
of milk. In the 37 with enlargement of jejuna
folds in response to milk, 31 showed complete
or partial return to the normal condition 20-2
min. after prednisolone admin. Three patients
with enteritis, but no milk incompatibility,
were improved following prednisolone treatment
The intestinal manifestations recurred in 80%
of those reacting to prednisolone after cessat
of therapy.

7207 STUDIES OF ANTIBODY FORMATION AGAINS
GLIADIN AND MILK PROTEINS. II. DET
MINATION OF γM BY ULTRACENTRIFUGATION AND TREA
MENT WITH MERCAPTOETHANOL. (Ger.) Mietens, C
(U. Wurzburg, Germany). Z. Kinderheilk. 99(2)
130-139. 1967.

Sera from 33 children with celiac disease (10)
and other chronic disorders (diarrhea, dyspeps
milk allergy, malnutrition, poisoning, hepatit
etc.) showed high levels of antibodies to glia
casein and lactalbumin. These antibodies were
sedimented by ultracentrifugation at over 50,0
indicating that they belong to the macroglobul
(γM, IgM, β_{2M} or 19s) series (molecular wt.
900,000-1 million). Treatment with 2M mercapt
ethanol (specific for macroglobulins) inactiva
the majority of the antigliadin antibodies, bu
had no effect on poliovirus antibodies (which
belong to the IgG or γG series). A part of th
antibodies to lactalbumin and casein also belo
to the macroglobulin series. Sera from health
controls showed lower levels of macroglobulins
It is concluded that the induction of 19s (γM)
antibodies is a specific antigenic property of
gliadin.

7208 HOOKWORM INFECTION AND INTESTINAL
ABSORPTION AMONGST AFRICANS IN UGANDA
(E.) Banwell, J. G. (Makerere Univ. Coll.,
Kampala, Uganda), P. D. Marsden, V. Blackman,

. Leonard and M. S. R. Hutt. Amer. J. Trop.
16(3):304-308, 1967.

0 patients with hookworm, 17 had severe
ia, malnutrition and hypoproteinemia, and
had occult blood in stools. Of 30 with
torrhea and malabsorption syndrome due to
nic exocrine pancreatic disease, 21 had pan-
tic lithiasis and all had abnormal responses
ancreozymin and secretin tests. Studies
uded 72-hr. stool collection; jejunal speci-
; D-xylose excretion (5 mg dose); vitamin A
$_{12}$ absorption; small intestine studies;
urement of total hookworm load in each pa-
t by direct counting after vermifugation (5
etrachloroethylene daily for 3 days) and
ing. Hookworm (mainly Necator americanus)
ranged from 66-3073 (8 above 1000); fecal
was normal (0.4-5.6 g/day) in all 12 patients
ed; of 11 jejunal biopsies 6 showed minor
rmalities (Grade 1-3), 5 had more definite
rmalities, none had "flat" mucosa; in 8 cases
ed, D-xylose excretion ranged from 0.6-2.2
r.; fasting vitamin A levels were low in
15, but overall studies were normal; vitamin
ests performed in 4 patients were normal;
small intestine X-rays, 4 were normal and 2
d coarse intestinal folds and flocculation
in the lower portion of jejunum and ileum;
infection with other parasites was observed
. Of 30 with malabsorption syndrome, only
a significant degree of hookworm infection,
teatorrhea persisted after vermifugation.
s concluded that hookworm infection was
er the cause of steatorrhea in patients with
orm disease, nor a contributory cause of
sorption in patients with exocrine pan-
ic disease and steatorrhea.

IRON ABSORPTION IN COELIAC DISEASE OF
CHILDHOOD AND ADOLESCENCE. (E.)
M. G. T. (Trinity Coll., Dublin, Ireland),
H. Taylor and P. B. B. Gatenby. Brit. Med.
5545):151-152, 1967.

children and young adults with proven celiac
se were studied. Of 4 treated previously
gluten-free diets, none was receiving dietary
rticosteroid treatment at the time of the
. All showed abnormal jejunal mucosa. In
t excretion was in excess of 7 g/day. In
re was evidence of Fe deficiency with either
hromic anemia or low serum Fe. Controls
ere without steatorrhea or other evidence
labsorption and were matched with the celiac
for sex, age, hemoglobin and serum iron
s. No patient exhibited gastrointestinal
ing or was receiving Fe therapy at the time
e study. Absorption was measured by a
iron balance method in which 3 mg of Fe, as
t hemoglobin, was given after a standard meal
ining 2.34 mg of Fe. Hemoglobin was labeled
vo with ^{59}Fe in doses of 0.3-0.5 mc. Fecal
ction was made until less than 1% of the dose
resent in a single day's collection. Serum
and fecal fat were measured, and jejunal
biopsies were made by a Crosby capsule. Controls absorbed 36-61% (mean 46%) of the Fe dose. One celiac patient showed malabsorption (9%) while 8 absorbed 31-60% (mean 48%). No relation between Fe absorption and jejunal mucosal grade, nor between Fe absorption and fecal fat content was observed.

7210 ACQUIRED SELECTIVE VITAMIN B_{12} MALABSORPTION. (E.) Hippe, E. (Cent. Hosp. Naestved, Denmark). Scand. J. Hemat. 4(2):97-104, 1967.

A 44-yr.-old woman received local X-ray treatment after removal of a reticulum cell sarcoma from the right axilla 10 yr. previous to this study. Subsequent irradiation was admin. because of enlarged lymph node in the left axilla and abdomen. Because of megalocytic anemia and normal serum iron, she received 3 inj. of liver extract, after which hemoglobin values returned to normal. She showed impaired absorption of vitamin B_{12} and this did not improve on admin. of 50 mg pig intrinsic factor. No other symptoms of malabsorption could be demonstrated. When 50 ml normal intestinal juice was admin. in conjunction with intrinsic factor, vitamin B_{12} was absorbed normally. This indicates that the patient lacked a factor in her intestinal juice which is of importance for normal absorption of vitamin B_{12}. It is suggested that the intestinal factor ("releasing factor") is proteolytic, so that the protein complex, vitamin B_{12}-intrinsic factor, is split off to form a B_{12}-peptide which is then absorbed, and vitamin B_{12} arrives at the liver, where it is deposited, in this form.

7211 THE EFFECT OF NEOMYCIN ON THE SMALL INTESTINAL MUCOSA OF THE MONKEY. (E.) Gilat, T. (Yale U., New Haven, Conn.), J. E. Morin and H. J. Binder. Laval Med. 38(4):352-355, 1967.

The effect of neomycin on glucose absorption was studied in two 4-5 kg female Macacca Mulatta monkeys in whom Thiry-Vella loops (34-45 cm) had been constructed. After an overnight fast, a size 12 Foley catheter was inserted into each end of the loop; the loop was inflated, perfused with water and normal saline, drained, and the distal catheter clamped; 10 ml of a soln. of 9 g% glucose and 4 g% polyethylene glycol were introduced through the proximal catheter which was then clamped; after 60 min. the loop was drained and rinsed 5 times with 5 ml tap water through the distal catheter; the combined perfusate was centrifuged and the supernatant analyzed for polyethylene glycol and glucose (recoveries of 90-110% were always obtained). The amount of glucose absorbed was equal to the difference between the initial 900 mg perfusion and the amount in the perfusate. Suction biopsies were taken at 4 cm from either end of the loop. There were 2 neomycin infusion schedules: in 1 neomycin was in direct contact with loop mucosa for 24 hr. in each infusion day; in 2, 4 hr. No alteration in histology of mucosa or histochemical distribution of leucine aminopeptidase, nonspecific esterase, succinic dehydrogenase, acid phosphatase, glucose-6-phosphate dehydrogenase and LDH was observed. In both schedules, neomycin depressed glucose absorption and this effect was a function of both time and dose. The decrease returned to normal and did not occur after schedule 2. The dissociation of absorption and morphology is emphasized.

7212 MAGNESIUM DEFICIENCY COMPLICATING INTESTINAL SURGERY. (E.) Heaton, F. W. (Gen. Infirm., Leeds, England), C. G. Clark and J. C. Goligher. Brit. J. Surg. 54(1):41-45, 1967.

Of 82 patients with gastrointestinal disease, hypomagnesemia was found in 25, 9 with severe deficiency (less than 1 mg/100 ml). Thirty-seven with ulcerative colitis were examined, 29 preoperatively and 8 whose postoperative course was complicated by electrolyte disorders. Of 29, 9 were treated medically, 20 by proctocolectomy. In 16 the disease was quiescent at examination and Mg level was normal. Of 13 with active disease, 3 had subnormal levels; 1 had involvement of large intestine from rectum to hepatic flexure; 2 had total involvement. Eight with prolonged electrolyte imbalance were examined 2 or more wk. after operation, and 4 were found to have hypomagnesemia. Fifteen were admitted for diagnosis, reassessment, or operation for Crohn's disease. Of 9 with minimal clinical disturbance, only 1 had hypomagnesemia; of 6 moderate to severe, 2. Four postoperative cases had severe hypomagnesemia, complicated by severe loss of intestinal fluid, sometimes associated with sepsis and intestinal fistulae. Patients with ulcerative colitis and Crohn's disease were at greatest risk. Of 6 admitted with symptoms associated with ileostomy, 3 had hypomagnesemia (1 severe). Of 5 patients with postgastrectomy symptoms associated with diarrhea and malabsorption, 2 had hypomagnesemia. Fifteen with prolonged electrolyte imbalance for 10 or more days after abdominal surgery were studied. Two with biliary tract disease were normal, and of 8 with colonic resection for diverticulitis or carcinoma 7 were normal. Severe depletion was found in 1 patient 2 mo. after successful resection of intestinal infarction. Hypomagnesemia was also found in 1 with appendicitis complicated by sepsis and ileus; in 1 after uterine transplant for pelvic cancer; in 1 with duodenal fistula following gastric surgery for peptic ulcer. Seven with low Mg had Ca below 8 mg/100 ml. Also found were hypokalemia (5); hyponatremia (5); hypoalbuminemia (9), associated with severe hypomagnesemia in 6.

7213 WATER AND SOLUTE MOVEMENT IN THE SMALL INTESTINE OF PATIENTS WITH SPRUE. (E.) Fordtran, J. S. (U. Texas Southwest. Med. Sch., Dallas), F. C. Rector, T. W. Locklear and M. F. Ewton. J. Clin. Invest. 46(3):287-298, 1967.

Water and electrolyte movement in the jejunum wa measured during perfusion with isotonic electrol soln. in normals and patients with sprue (adult celiac, 9; tropical, 1). Water, Na, and K were absorbed in normals, but were secreted into the intestinal lumen in those with sprue (7; 1), who had diarrhea and steatorrhea. This suggests that the jejunal mucosa of these sprue patients was in a secretory state with respect to water and electrolytes. Using simultaneous diffusion rates of solutes with different molecular radii, abnormalities in the effective pore size in disease states can be detected. Since this is independent of water flow in response to osmotic pressure gradients, it can be used in disease states accompanied by abnormalities in absorptio and secretory processes involving water. In the jejunum, the ratio of urea to tritiated water diffusion was 0.2 in sprue patients, 0.8 in controls. This suggests a marked decrease in the effective pore size in those with sprue. Furthe support of this was the finding that L-xylose and erythritol, which have larger diameter than urea, were nonabsorbable in the sprue intestine. Studies with antidiuretic hormone showed that th permeability barrier of the small intestine was not controlled by the posterior pituitary gland. The secretion of water and electrolytes and the reduced effective pore radius in patients with sprue are not necessarily interdependent. Two with moderate celiac sprue (biopsy) who did not have diarrhea or steatorrhea did not secrete water or electrolytes, but did show a marked decrease in effective pore radius.

7214 MODIFICATIONS OF INTESTINAL ABSORPTIO OF p-AMINOHIPPURIC ACID IN ANCYLOSTOMIASIS. (It.) Loschiavo, F. (U. Messina, Italy) and D. Gallo. Arch. Ital. Sci. Med. Trop 47(9-10):233-248, 1966.

Among 10 normal subjects, mean serum levels of p-aminohippuric acid were calculated at interva of 10, 20, 30, 60 and 90 min. after ingestion o 6 g of the substance in the form of its Na salt as follows: 1.16, 3.20, 2.82, 2.42 and 1.93 mg/liter, resp. Comparable tabulations among 1 subjects with confirmed ancylostomiasis were 0. 2.20, 2.00, 1.49 and 1.03 mg/liter, resp. It i concluded that the infestation involves a statistically significant diminution of intestinal mucosal absorption of p-aminohippuric acid, pro ably due to a combination of the effects of intestinal mucosal lesions and a disturbance of intestinal biochemistry which is mediated direc by the presence of the parasite.

7215 INTESTINAL ABSORPTION IN PATIENTS UNDERGOING ESOPHAGEAL-ILEAL-COLONIC RECONSTRUCTION FOR BENIGN ESOPHAGEAL STENOSIS. (It.) Balzola, F. (U. Turin, Italy), A. Pera, R. Dematteis and G. Bricco. Minerva Gastroent. 12(4):123-127, 1966.

Surgical reconstruction of the esophagus, ileum

d colon was performed on 2 boys, aged 14 and
, a 17-yr.-old girl and 4 men, 3 women, aged
-60. All were suffering from benign esophageal
enosis; all recovered without incident and were
le to resume their normal occupations. Total
cal vol. per 24 hr. was increased after surgery
6 of 10, with an increased frequency of
fecation in 5 of 6; 6 of 10 showed increased
imination of fecal nitrogen; 1 of 10 developed
eatorrhea; 4 of 10 developed mild hypocarotinemia
d 1 of 10 developed severe hypocarotinemia as
rt of a generalized malabsorption syndrome.
is patient, a 26-yr.-old woman, had also under-
ne ablation of the esophagus and total abdominal
gotomy. In 8 of 10, urinary excretion of xylose
s reduced considerably, but remained within
rmal limits in 6 of 8. In 1 patient, who had
eviously undergone gastroenteroanastomosis,
e second intervention failed to increase or de-
ease an existing impairment of digestive func-
on, which, however, did not include signs of
absorption syndrome.

6 LEUCOCYTE ASCORBIC ACID LEVELS IN
PATIENTS WITH MALABSORPTION OR PREVIOUS
STRIC SURGERY. (E.) Williamson, J. M.
uthern Gen. Hosp., Glasgow, Scotland), A.
dberg and F. M. L. Moore. *Brit. Med. J.*
543):23-25, 1967.

ascorbic acid levels were measured in 26
ients who either had intestinal malabsorption
; 6 men and 7 women; av. age 50 yr.; 2 with
opathic and 5 with unclassified steatorrhea,
ach with multiple diverticulae, reticulum-cell
coma and pancreatic steatorrhea, and 3 mis-
laneous who were thought to have adult celiac
ease) or had undergone gastric surgery (13;
en and 7 women; av. age 59 yr.; 6 had gastro-
erostomy and vagotomy, 4 Polya partial gas-
ctomy and 1 each Billroth I gastrectomy,
al gastrectomy and pyloroplasty alone) and
pared with those in 26 control subjects. The
n WBC ascorbic acid level in both of the
mer groups together was 11.7 $\mu g/10^8$ WBC, com-
ed to 20.8 $\mu g/10^8$ WBC in controls; this was
tistically significant. In the malabsorption
up alone, it was 10.7 $\mu g/10^8$ WBC and in the
tric surgery group it was 12.7 $\mu g/10^8$ WBC;
in, the difference observed between the mean
each group and that of the control group was
tistically significant. Mean WBC ascorbic
d level in all patients with steatorrhea,
ardless of the group, was 10.0 $\mu g/10^8$ WBC,
ch was not significantly different from the 2
ups as a whole. In 24 of the 26 patients
died, the diet history was considered reliable,
in these cases the mean daily intake of
amin C was 41.1 mg/day (with a range of 12-91
day); none of the patients had a dietary in-
e of vitamin C below 10 mg/day, the minimal
tective level against scurvy. In 12 of 26
trols, the mean intake of vitamin C was 60.0
day. Five of 26 patients had clinical evidence
increased capillary fragility and 3 had purpura
the arms and/or legs. The platelet count was
within the normal range in all patients. It is suggested that patients with intestinal malabsorption and those who have undergone gastric surgery, especially the elderly, should have their diet supplemented with vitamin C.

7217 LOW SERUM CHOLESTEROL LEVELS AND SUBCLINICAL MALABSORPTION. (E.) Robins, S. J. (U. Puerto Rico Sch. Med., San Juan), M. Garcia-Palmieri and C. Rubio. *Ann. Intern. Med.* 66(3):556-567, 1967.

Men (102 of 136, 45-62 yr. old) who had been examined at a Heart Program within a prescribed period of time and whose serum cholesterol level was 160 mg/100 ml or less (61 of 77 men) and 260 mg/100 ml or more (41 of 59) were given D-xylose absorption tests. All were currently living in metropolitan San Juan or a rural community in the central mountains of Puerto Rico (Naranjito). Of those with low cholesterol levels, 56%, as compared to only 15% of those with high values, had xylose excretions equal to or less than 4.0 g and 20% of those with low cholesterol levels had what was considered to be an unequivocally normal test response (greater than 5.0 g/5 hr.). In the absence of any observed significant dietary differences, malabsorption appeared to be the mechanism responsible for the low serum cholesterol values. As a group, those with impaired xylose absorption were clinically indistinguishable from nonaffected individuals; relevant gastrointestinal symptoms occurred with comparable frequency. Although predominantly of rural residence, the malabsorbing group was of favorable socioeconomic circumstances. Extended investigations in those with xylose excretions of less than 4.0 g provided corroborating evidence of small-intestinal disease in conjunction with usually absent to minimal jejunal histologic abnormalities. It is suggested that in Puerto Rico, where mortality from coronary heart disease in men in the 45-64 yr. old age group is half of that in the United States, widespread, occult malabsorption, through its postulated effect on cholesterol, may play a major and decisive protective role.

7218 STUDIES ON THE ABSORPTIVE DEFECT FOR TRIGLYCERIDE IN ABETALIPOPROTEINEMIA. (E.) Ways, P. O. (U. Washington Sch. Med., Seattle), C. M. Parmentier, H. J. Kayden, J. W. Jones, D. R. Saunders and C. E. Rubin. *J. Clin. Invest.* 46(1):35-46, 1967.

In 3 patients with confirmed abetalipoproteinemia, p.o. biopsies of the duodenum were obtained following *ad libitum* (fasting) diet and various lipid regimens including fat-free, added fat and single load diets and then compared with normal preparations. Fasting patients showed larger and more numerous lipophilia vacuoles than in normal fasting subjects and also an increased (1.5-3.5 times) total lipid content which was mostly triglyceride. The triglyceride fraction (as percentage of total lipid) was increased from 2-3.5 times and as percentage biopsy wet wt. was increased from 2.5-11 times. These findings were confirmed by thin-layer chromatography. In one patient who was maintained on a fat-free diet (0.3 g fat/day) for 34 days, serial studies showed a progressive decrease in mucosal lipophilia within the absorptive cells of the upper third of the villus. At 34 days, excess lipophilic particles were observed in the villus tip and both total lipid and triglyceride were still increased. Periods of fat diet supplementation after fat-free programs resulted in increased fat content of mucosal specimens, improved coefficient of fat absorption during a 14-day trial of 8.5 g of fat/day plus 28 g corn oil/day and a correlation between stool lipid excretion/day and both mucosal lipid and triglyceride as percentages of wet biopsy wt. and total lipid fraction, resp. After acute fat load, the definite qualitative changes in both mucosal and plasma lipids were not as great as in normal individuals. The route by which dietary fat is absorbed in patients with abetalipoproteinemia who were given extended programs of various types of dietary fat is not known at present.

7219 GASTRECTOMY AND IRON ABSORPTION: EFFECTS OF BLEEDING, IRON LOADING AND ASCORBIC ACID IN RATS. (E.) Rieber, E. E. (727 Bronx River Rd., Bronxville, N. Y.), M. E. Conrad and W. H. Crosby. Proc. Soc. Exp. Biol. Med. 124(2):577-580, 1967.

Male albino WRCF rats were fed a standard rat and mouse diet containing 15 mg of Fe/100 g of dry wt.; the rats consumed approx. 2 mg Fe/day on this diet. Half of the rats were gastrectomized 1 mo. before initiation of Fe-absorption studies. Normal controls were 48 rats of comparable wt. Rats were Fe-loaded by i.m. inj. of 25 mg of Fe as dextran-Fe, 7-14 days before Fe-absorption studies. The latter were performed by admin. of test doses of radioiron; test soln. contained 0.25 μc of ^{59}ferric chloride ($^{59}FeCl_3$) and 0.25 mg of elemental Fe as ferrous sulfate ($FeSO_4$), brought to a vol. of 1 ml with Fe-free distilled H_2O. Gastrectomized rats developed an anemia that responded to parenteral doses of Fe. Negative benzidine tests on fecal collections from 30 of 32 animals indicated that anemia was not caused primarily by intestinal bleeding. Normals absorbed significantly more radioiron from test doses of $FeSO_4$ than gastrectomized rats (13 ± 3.8 vs. 6.9 ± 2.4%). Addition of ascorbic acid (10 mg) to test doses increased the amount of ^{59}Fe absorbed by both groups, but the differences were insignificant (17.5 ± 8.2% vs. 12.7 ± 5.9%). Fe-loaded gastrectomized animals absorbed approx. the same amount of ^{59}Fe from test doses as normals that received i.m. inj. of dextran-Fe (5.6 ± 3.7% vs. 4.2 ± 1.0%). If Fe-loaded rats were given test doses of radioiron containing ascorbic acid, both intact and gastrectomized rats absorbed similar amounts of Fe (7.9 ± 2.6% vs. 6.9 ± 2.2%). Similar studies in rats that were bled and fed a milk diet revealed marked differences in Fe-absorption between all groups of control and gastrectomize rats. Intact animals absorbed 59.1 ± 12.1% vs. 17.7 ± 3.8% in gastrectomized rats. Similar differences occurred if ascorbic acid was added to the test dose (55.1 ± 13.6% vs. 19.8 ± 2%), if Fe-loaded-phlebotomized rats were given p.o. dos of Fe containing ascorbic acid (30.4 ± 14.1% vs. 9.2 ± 5.1%) or if the rats had been overloaded before bleeding (57.5 ± 12.7% vs. 12.4 ± 4.3%). Even Fe-loaded rats that were bled only 2.5 ml absorbed significantly greater amounts of ^{59}Fe from test doses than similarly treated gastrectomized rats (24.4 ± 6.0% vs. 7.1 ± 2.4%). It is suggested that Fe-deficiency occurred after gastrectomy because of an inability to adjust absorption in response to changes in the body requirement.

7220 SENSITIZATION AND ALLERGIC MANIFESTATIONS IN PATIENTS WITH RESECTED STOMA (Ser.) Burijan, J. (U. Belgrade, Yugoslavia) a J. Ljaljević. Srpski Arh. Celok. Lek. 94(9): 755-760, 1966.

7221 LACTOSE-GALACTOSE MALABSORPTION IN ADULTHOOD. (Ger.) Rommel, K. (Justu Liebig U., Giessen, Germany), K. Grimmel and W. Adam. Med. Welt 18(22):1376-1383, 1967.

7222 MALABSORPTION SYNDROMES. A CASE OF ENZYMOPATHIC STEATORRHEA. (Sp.) Tarruella, J. (U. Barcelona, Spain), M. Dalmau-Ciria and J. M. Montoliu. Med. Clin. (Barcelon 48(4):232-241, 1967.

7223 EFFECT OF WHEAT PROTEINS IN CELIAC DISEASE. (E.)(Rev.) Kowlessar, O. D (Jefferson Med. Coll., Philadelphia, Pa.). Gastroenterology 52(5):893-896,1967.

7224 MEASUREMENT OF CHANGES IN INTESTINAL ABSORPTION OF SOME CARBOHYDRATES IN PATIENTS IRRADIATED TO THE ABDOMEN. (It.) Giannardi, G. F. (U. Florence, Italy), S. De Ma R. Renzi and G. Boddi-Giannardi. Nunt. Radiol. 32(8):723-730, 1966.

7225 EXPERIENCES WITH INFANTILE INTOLERAN TO LACTOSE. A REPORT OF SIX CASES. (E.) Bush, R. T. (Hutt Hospital, Lower Hutt, New Zealand), C. P. Anyon and K. G. Clarkson. New Zeal. Med. J. 66(415):145-152, 1967.

7226 PHYSIOPATHOLOGY OF IRON ABSORPTION. (Fr.) Rochant, H. (Franco-Musulman Hosp., Bobigny, France), B. Dreyfus and C. Sult Nouv. Rev. Franc. Hemat. 7(2):239-259, 1967.

7227 METHOTREXATE IN TREATMENT OF PSORIASI CASE REPORT OF A SEVERE REACTION SECONDARY TO INDUCED MALABSORPTION. (E.) Stebbins, P. L. (Mason Clin., Seattle, Wash.) a C. C. Pearson. Bull. Mason Clin. 21(1):20-30,

See also abstract nos.: 6846,6848

228 COMPARISON OF RECTOSIGMOID MOTILITY IN
NORMAL CHILDREN, CHILDREN WITH RECURRENT
BDOMINAL PAIN, AND CHILDREN WITH ULCERATIVE
OLITIS. (E.) Kopel, F. B., I. C. Kim and G. J.
arbero (Children's Hosp., Philadelphia, Pa.).
ediatrics 39(4):539-545, 1967.

ectosigmoid motility was studied in 18 children
ith recurrent abdominal pain without evident
rganic etiology, in 10 children with ulcerative
olitis, and in 18 normal children. Motility was
tudied using saline-filled open-tipped polyethy-
ene tubes (internal diameter 2 mm), inserted to
mm and 12 mm from the anus for simultaneous
ecording, connected to strain gauges (Statham
23B) with readout on a multichannel recorder.
ube patency was maintained by constant infusion
f saline at 9 ml/hr. When necessary, colonic
ube position was checked by fluoroscopy. After
ube insertion, a baseline of rectosigmoid activity
as established over 30 min. Then 0.5 mg prostig-
ne methyl sulfate was inj. s.c. and the following
min. of rectosigmoid activity was recorded.
hose with recurrent abdominal pain showed a
eightened response to prostigmine with increased
ectosigmoid motility. These results are
milar to those in adults with the spastic colon
riety of irritable colon. On the basis of
inical and physiological similarities, it is
ggested that the adult and childhood disease
ntities are the same. Children with ulcerative
olitis showed reduced rectosigmoid activity.

229 MEGASIGMOID SYNDROME IN DIABETES AND
NEUROLOGIC DISEASE. REVIEW OF 13 CASES.
.) Berenyi, M. R. (Bird S. Coler Hosp., Welfare
sland, N. Y.) and G. S. Schwarz. Amer. J.
stroent. 47(4):311-320, 1967.

tients (4 men, 9 women) were 39-89 yr. old.
existing diseases were: diabetes mellitus (2
n, 5 women); diabetes mellitus and Parkinson's
sease (0,2); Parkinson's disease (2,0); traumatic
raplegia (0,2). Signs and symptoms included
stended abdomen (4,9); volvulus and subsequent
rgery (2,2); constipation (0,4); prolonged
arrhea (4,5). Bowel habits of constipation,
arrhea, and normal, resp., were found in:
abetes (1,6,0); diabetes and Parkinson's
,1,0); Parkinson's (0,2,0); traumatic paraplegia
,0,0). Surgery for reduction of sigmoid volvulus
s necessary in 4 (2 men, 2 women). Volvulus
s reduced in 2 women by insertion of a high
ctal tube. Ba enema was capable of deflating
volvulized sigmoid even in those eventually
quiring surgery. Ba enema established the
agnosis easily by filling the distended sigmoid
op with contrast material. When distended,
e sigmoid tended to extend into the right half
the abdomen as well. The incidence of diabetes
llitus (9 of 13) was 3 times higher than that
the rest of the hospital population (22%).
arrhea occurred in most patients, especially
abetics. It is suggested that visceral diabetic
neuropathy may have contributed to or increased development of megasigmoid in 9. Dysfunction of the autonomic nervous system was implicated in all 13. No anatomical changes were observed in submucosa or myenteric nerve of excised colon.

7230 AN ELECTRON-MICROSCOPE AND HISTOCHEMICAL STUDY OF MELANOSIS COLI. (E.) Ghadially, F. N. (U. Sheffield, England) and E. W. Parry. J. Path. Bact. 92(2):313-317, 1966.

Colon tissue was obtained from sigmoidoscopic examination of patients with melanotic colons. Specimens were fixed in osmium tetroxide, embedded in araldite, 0.5-1.0 μ sections were stained with metachromatic blue (60°C) at pH 6.8 for light microscopy and sections for electron microscopy were unstained or stained with lead citrate. For light microscopy and histochemistry, melanotic colons were fixed in formalin, samples inbedded in paraffin, stained with hematoxylin and eosin and the following methods: Fontana, Prussian blue, periodic acid-Schiff, Ziehl-Neelsen, nile blue sulfate, bleaching with potassium permanganate and oxalic acid, and Unna-Pappenheim. Frozen sections were stained with oil red O and some were examined under UV for fluorescence. Small squares of colonic mucosa were prepared for demonstrating melanocytes. Light microscopy and histochemistry showed melanocytes to be located in the mucosa and submucosa just below the muscularis mucosae and confirmed that the pigment gives many reactions for both lipofucsin and melanin. Electron microscopy showed that the large melanocytes had oval nuclei with indentation(s), numerous smooth-walled vesicles, some mitochondria, scanty endoplasmic reticulum, and many ribonucleoprotein particles free in the cytoplasm; pigment granules of complex morphology; plasma cells lacked pigment particles; the submucosa was thickened and edematous; small and large collections of electron-dense particles in the smooth muscle fibers of the muscularis mucosae; pathological lesions of epithelial cells, some with large deposits of glycogen, and widening of intercellular junctions. Granules in epithelial cells arise from areas of focal cytoplasmic degeneration involving mitochondria, endoplasmic reticulum, and glycogen.

7231 PATHOLOGY AND PROGNOSIS OF CANCER OF THE COLON AND RECTUM. (E.) Morson, B. C. (St. Mark Hosp., London) and H. J. R. Bussey. Schweiz. Med. Wschr. 97(18):568-570, 1967.

Data (from 1928-1962) for 3596 patients with rectal cancer is presented. Crude 5-yr. survival rate was 34.7%, corrected survival rate ("cure" rate = crude survival rate expressed as a % of expected number of 5-yr. survivors in a similar population sample, allowing for death from other causes) was 41.8%, corrected rate for inoperative (radiated) cases was 3.4%, and that for operated (radical and palliative) was 57.4%. At 10, 15 and 20 yr., the corrected rates were 51.5%, 49.7% and 50.7%, resp. According to Dukes A, B, C system, corrected 5-yr. rates were 97.7%, 77.6% and 32.0%, resp. (all cases 57.4%); 10-yr. were 97.3%, 70.0% and 26.2%; 15-yr. were 90.4%, 68.8% and 25.2%; 20-yr. were 95.2%, 72.3% and 25.8%. Only 3.3% of 2305 cases from 1948-1962 were early rectal cancer. Rectal cancer was rarely detected at an early stage, and individual pathologists could not expect to see more than occasional examples of so-called 'malignant polyps'. Because of low frequency of early diagnosis, the incidence of Dukes A, B and C cases for each 5-yr. period (1928-1962) was calculated. Dukes A was constant at 15%; B, constant at 35%; C, constant at 50%. This shows that rectal cancer is not being diagnosed any earlier now than in 1928, but this must be considered in light of the 1953-1957 resectability rate of 93.1% as compared with 46.6% in 1928-1932. About 56.6% of intestinal cancers had a preceding 'pre-invasive' or benign phase. When extent of spread was limited to bowel wall, incidence of origin in benign tumor was 18.3%; when spread in continuity involved extramural tissues, incidence was only 7.6%; overall incidence of origin in benign tumor for all 2305 cases examined was 10.6%. Of 3381 patients undergoing surgery for removal of rectal or colonic malignant tumor, 1.6% developed a second primary tumor in residual bowel (corrected rate expected to be 3.5%), the time interval varying from 3 mo.-29 yr. (av. 8.5 yr.). A patient with adenomatous polyps in the first operative specimen had twice the chance of developing a second primary intestinal cancer than when no such polyps were present (2.67% as opposed to 1.14%).

7232 RECURRENCE AND MORTALITY RATES IN SIGMOID VOLVULUS. (E.) Hines, J. R. (Northwestern U. Med. Sch., Chicago, Ill.), R. E. Geurkink and R. T. Bass. Surg. Gynec. Obstet. 124(3):567-570, 1967.

A study of 45 patients (28 male, 17 female), av. age 66 (31-92), with sigmoid volvulus was reported. All 45 had obstipation and distention. Reduction by proctoscopy and well-lubricated, long rectal tube was successful in 29 of 37 cases. Reduction by laparotomy was done in 11 cases. Of 14 patients given Ba enemas before reduction, 6 exhibited reduction of the volvulus due to the Ba column and 6 showed spontaneous reduction. Only 2 patients died with an unreduced volvulus. Of 52 early reductions, there were 9 early recurrences and 43 original reductions. Recurrences followed every method of reduction, for an overall rate of 90%. Overall mortality rate was 40%. Only 1 of 13 patients receiving conservative therapy was alive after 18 mo. Of 19 patients who had simple elective sigmoid resection with end-to-end anastomosis, 18 survived. Treatment involving elective sigmoid reconstruction by primary end-to-end anastomosis is recommended immediately after reduction.

7233 SELECTIVE ARTERIOGRAPHY IN CANCER OF THE RECTUM. (Fr.) Parturier-Albot, (Coll. Med. Hosp., Paris), C. Hernandez, M. Champeau, L. Boccon-Gibod and G. Albot. Sem. Hop. Paris 43(18/4):1177-1190, 1967.

Arteriography (inferior mesenteric artery) was performed in 9 patients with carcinoma of the rectum; angiographic examinations (venous in 2 cases, arterial in 4 cases) were also performe on 6 operative specimens. Dilatation of the nutrient artery, abnormal distribution of the arteries and capillaries, and early venous ret were noted in the malignant tumors. In additi to these characteristic findings, large tumors showed amputation of certain venous trunks and an absence of early venous return in the prese of deep infiltration of the disease. Cure of the tumors (in 4 cases) following contact radi therapy was accompanied by disappearance of al the angiographic signs of malignant disease. these patients, disappearance of the disease was confirmed by histological examination of surgical specimens.

7234 THE CECAL APPENDIX AND RHEUMATIC FEV (HISTOLOGIC STUDIES.) (It.) Cervin (U. Rome), M. Palleschi and G. Stella Therapeutikon 7(4-5):267-285, 1966.

A histopathologic study was made of 100 vermif appendices derived from 47 male and 53 female patients, aged 3-42 yr. (mean age, 19). A his of rheumatic fever was elicited from 4 of 100, a history suggesting disorder of the heart val from 14 of 100 (verified in 4 of 14). There w no statistically significant differences betwe rheumatic and nonrheumatic patients as concern tonsillectomy or the course of severity of appendicitis. No histologic or other differen could be demonstrated in the appendices derive from rheumatic patients.

7235 BASALOID CARCINOMA OF THE ANAL CANAL (E.) Pang, L. S. C. (St. Mark's Hos London) and B. C. Morson. J. Clin. Path. 20(2 128-135, 1967.

Of 206 cases (17 men, 19 women, 41-80 yr., av. 60) of squamous cell carcinoma of the anus and anal canal, 36 (18%) were basaloid. Exact tum localization was possible in 33. In 23 the tu was entirely above, in 6 mainly above, in 4 astride the anal valves (dentate line). Tumor were divided into 3 groups on the basis of the amount of palisading and the extent to which t retained their capacity to form circumscribed clumps of cells: well-differentiated basaloid carcinoma (10); moderately differentiated (12) poorly differentiated and anaplastic (14). Because of advanced disease, 6 received no sur treatment, but only radiotherapy, none survivi 5 yr. Of 3 undergoing local excision of prima tumor, 1 died within 3 yr., and 2 are alive at 1 and 8 yr., resp. Excision of rectum and ana region was performed in 27. There were 3

toperative deaths, loss of 1 to follow-up,
3 are alive at less than 5 yr. Of the re-
ning 20, 11 (55%) have lived more than 5 yr.,
25%) more than 10 yr. Of the 9 who died before
r., 8 died of recurrence. Of those undergoing
tal excision, 6 had hemorrhoidal lymph node
olvement, 2 had hemorrhoidal and inguinal, 2
inguinal only. Five-yr. survival was 40%; the
urvivors were alive after 10 yr. Of 10 with-
lymph node metastasis the 5-yr. survival was
. None had shown signs of recurrence; 2 were
ing after 10 yr. It is concluded that cases of
l-differentiated and moderately differentiated
aloid carcinomas have a good prognosis, even
n lymph node metastasis has already taken place.
prognosis for anaplastic basaloids is poor
n in the absence of lymph node involvement.

5 TECHNIC OF ABDOMINOPERINEAL RESECTION
OF THE RECTUM. (E.) Localio, S. A.
v York U. Med. Ctr., N. Y.), W. R. N. Grier
A. H. Postel. Surg. Gynec. Obstet. 124(3):
-602, 1967.

echnic of abdominoperineal resection of the
tum, conforming closely to that originally
cribed by Miles in 1910, is described; refine-
ts of the original technic include the placement
construction of the stoma, obliteration of
pelvic dead space and the primary closure of
perineum. The colon stoma is brought through
upper end of the main laparotomy incision and
efully sutured to the edges of the peritoneum
fascia. The open end is sutured to the skin,
the pelvic peritoneum is not closed. A suture
e that is prone to disrupt and cause internal
iation and intestinal obstruction is thus
inated. Descent of the omentum and small
estine to obliterate the pelvic dead space
ws primary suture and healing of the perineum.
2 abdominoperineal resections performed with
procedure, there was no intestinal obstruction
to pelvic adhesions. One patient required
rotomy and division of an obstruction adhesion
the small intestine to the stump of the ligated
rior mesenteric vessels; 3 other patients with
l intestinal ileus were successfully managed
ntestinal suction.

INFLAMMATORY LESIONS OF THE LARGE INTES-
TINE IN VENEZUELA. (Sp.) Celli, B. B.
. Med., Central U. Venezuela, Caracas).
N. 20(4):727-753, 1966.

review of 2,500 autopsy records, 104 cases
found in which ulcerative colitis was either
immediate cause of death or a major contribut-
factor. Included were 51 cases of bacterial
rocolitis; 29 of amebic dysentery; 7 of idio-
ic ulcerative colitis; 6 of stenosing, rectal
hogranuloma of venereal origin; 2 cases, each,
iverticulitis, colitis due to schistosomiasis,
ngyloidiasis and intestinal tuberculosis; 1
each of cystic colitis with pellagra,
ntidiasis and typhoid fever. Although diverticulosis was evident in 150 of the total autopsy group, diverticulitis was found in only 2, as noted above. Both were women, aged 80 and 85, resp., and both were suffering from chronic peritonitis. Although the age range in other patient groups was very wide, the patients with idiopathic ulcerative colitis (4 men; 3 women) ranged only from 23-40 yr. The disorder was the immediate cause of death in 4 of 7; in 2 of 7, the immediate cause was pneumonia; in 1 of 7, it was acute alcoholism. Among patients with amebic dysentery, 17 of 29 had perforated ulcers of the colon; 17 of 29 had hepatic lesions and 6 of these had perforated into the peritoneal cavity. Among patients with bacterial enterocolitis, the disorder, which was the immediate cause of death in 30 of 51, was limited to the colon in 39 cases, involved both the small and large intestine in 11, and involved the entire gastrointestinal tract, including the stomach and esophagus, in 1 patient. No cases of Crohn's disease were found in the autopsy records which were reviewed for this study.

7238 CONSERVATION OF THE INFERIOR MESENTERIC ARTERY BY SKELETIZATION IN ANTERIOR RESECTIONS FOR RECTOSIGMOID CANCER. (It.) Virno, F. (U. Rome,), A. Aureggi and F. Barillari. Policlinico [Chir.] 73(3):127-152, 1966.

A total of 19 patients with rectosigmoid cancers (12 men, 7 women; aged 60-70 yr.) were treated by anterior resection of the rectum accompanied by section of the inferior mesenteric artery at its source. The tumor was found in the sigmoid colon in 10 of 19; in the rectal ampulla in 9 of 19. Intestinal continuity was restored by side-to-side anastomosis in 6 of 19, by end-to-end anastomosis in 13 of 19. The surgical mortality rate was 15.7% (3 of 19) and subsequent partial or total dehiscence of the anastomosis occurred in 3 of 16 and 1 of 16 remaining, resp., between postoperative day 7-11. Anterior resection of the rectum with conservation of the inferior mesenteric artery was practiced in 41 patients with similar tumors (22 men, 19 women; aged 28-87 yr., median age was 59 yr.). The tumor was found in the sigmoid colon in 24 of 41; in the rectal ampulla in 4 of 41; at the rectosigmoid junction in 11 of 41. Simultaneous cancerization of the ascending and sigmoid colon was seen in 2 of 41. Intestinal continuity was restored by side-to-side anastomosis in 11 of 41; by end-to-end anastomosis in 30 of 41. The surgical mortality rate was 12% (5 of 41), with no subsequent partial or total dehiscence of the anastomosis among the 36 patients remaining. In addition to the indicated advantages of the second technic, a study of the material excised from both groups of patients showed that the medial hemorrhoidal artery was absent bilaterally in 20%, so that an adequate blood supply to the rectal ampulla could not be guaranteed if the inferior mesenteric artery was ligated or sectioned.

7239 MECONIUM BLOCKAGE SYNDROME. (E.) Mikity, V. G. (U. Southern California

Sch. Med., Los Angeles), J. E. Hodgman and J. Paciulli. Radiology 88(4):740-744, 1967.

The incidence of meconium blockage was 1/1,000 admissions (41 cases reviewed) with a sex ratio of 2:3 in favor of male patients. Initial symptoms included a characteristic green-stained vomitus and abdominal distention observed between 9-80 hr. after birth. Lethargy, irritability, and respiratory distress developed in some infants. Initial radiographic appearance was that of low intestinal obstruction. Use of Ba enema proved helpful in differentiation between meconium blockage and other conditions including meconium ileus, ileal atresia and congenital megacolon as well as in relieving bowel distention. Five infants were successfully treated by digital examination only, while all except 3 of the remaining infants showed alleviation of distention following Ba enema. Some cases required saline or peroxide enemas. Symptoms lasted for 3-12 days in all patients. Three infants with meconium blockage underwent colostomies during the newborn period due to increasing abdominal distention and debilitation. Three premature infants died of unrelated causes (1 of meningitis and 2 of intraventricular hemorrhage). All of the remaining infants, except one who developed congenital megacolon, showed subsequent normal intestinal function. Markedly reduced values of trypsin (0-35 μg/g) were noted within the first 3 days of life in stool specimens from 3 infants, but the values normalized by 5 days of age.

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7241 ASYMPTOMATIC POLYPS OF THE RECTUM AND COLON. I. A REEXAMINATION. (E.) Drexler, J. (Southern California Permanente Med. Gr., Los Angeles). Arch. Intern. Med. (Chicago) 119(5):503-509, 1967.

7242 CLINICAL HISTORIES OF 254 CASES OF NEOPLASMA OF THE COLON, SIGMOID AND RECTUM. (It.) Francesco, C. (U. Modena, Italy), L. Luca and V. M. Clara. Rass. Clin. Sci. Ist. Biochim. Ital. 43(4):118-123, 1967.

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7250 ADENOCARCINOMA OCCURRING IN VILLOUS ADENOMAS OF THE APPENDIX. (E.) Saltzstein, S. L. (U. California, San Diego) a H. J. White. J. Abdom. Surg. 9(6):164-166, 19

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CANADIAN FORCES HOSPITAL, HALIFAX.
(E.) Willoughby, D. V. (Dalhousie U., Halifa
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See also abstract nos.: 6745,6844,7119,7307

UROLITHIASIS IN CROHN'S DISEASE AND
ULCERATIVE COLITIS. (E.) Gibson,
. (Pembury Hosp., Tunbridge, Wells, Kent,
and). Guy. Hosp. Rep. 115(4):443-447, 1966.

patients with ulcerative colitis and one
Crohn's disease in association with
ithiasis were treated. One patient had a
acid stone removed 6 yr. after undergoing
colectomy and ileostomy for fulminating
rative colitis. Serum uric acid was normal.
cond patient was treated by nephrectomy for
rge staghorn calculus 17 yr. after ileostomy
partial colectomy for ulcerative colitis.
stone was composed of uric acid with small
es of calcium. The urine was not infected
was uniformly acid. Six yr. after original
ery, the patient suffered an episode of right
l colic which subsided after passage of
el in the urine. A third patient who had
treated for 12 yr. for ulcerative colitis,
loped a right renal colic which subsided in
ys after passage of gravel in the urine.
tion of the renal pelvis and upper ureter
shown by i.v. pyelogram. A fourth patient
a 1 yr. history of ulcerative colitis
aled a staghorn calculus at barium enema,
subsequently succumbed to a perforated
enal ulcer 3 days after nephrectomy. A
h patient who had been treated by numerous
ical procedures for Crohn's disease (15 ft.
mall intestine resected) had passed numerous
l stones during the last 3 yr. Multiple
ities were observed in the renal papillae by
y. One stone examined consisted of calcium
ate. This patient revealed only a slight
bolic acidosis. Factors suggested for stone
ation in these patients probably involve a
eased vol. of concentrated urine and lowered
ary conc. of sodium and potassium ions.

NONSPECIFIC GRANULOMATOUS, SEGMENTAL
COLITIS. (It.) Cosmacini, G.
giore Hosp., Milan, Italy) and G. Bettinelli.
. Fisiopat. Clin. Ter. 38(2):86-126, 1966.

tailed discussion follows a summary
entation of clinical symptoms, localization
esions, radiologic findings, surgical find-
and histologic findings made for a total of
dult patients (11 men, 10 women; aged 21-59
and 1 infant (a 5 yr.-old boy) who were
ated for nonspecific, regional, granulo-
us colitis. Presenting symptoms consisted
bdominal pain (22 of 22), tumefaction
of 22), disturbances of the lower tract
of 22) and fever (8 of 22). In 7 of 22,
lization was essentially within the colon
lf (3 of 7 = sigmoid; 2 of 7, each, = in the
t and left colon); in 15 of 22, the cecum
ed as an epicenter for the spread of the
rder. It is concluded that distinguishing
e 2 basic forms of the disorder makes it
ible to explain the widely variant histologic findings encountered as nothing more than different chronologic phases of the same disease entity; which, in turn, may be defined in terms of a generic response on the part of the organic substrate, rather than in terms of specific characteristics of the granulomatous process, as such. Sub-groups under the general category of cecal epicentricity included filling defects; funnel-like, stenosing constriction; total obliteration of the cecal lumen by hyperplastic granulomatous tissue; girdle-like, stenosing constriction; paracecal tumefaction. A type of belt-like, stenosing constriction of primarily colonic origin was also observed.

7291 ON THE TREATMENT OF IDIOPATHIC PROCTOCOLITIS WITH IMMUNOSUPPRESSIVE DRUGS. (It.) Caprilli, R. (U. Rome), G. Badalamenti and R. De Santis. Policlinico [Med.] 73(6):349-360, 1966.

Azathioprine (Imuran = 2.5 mg/kg/day x 20-180) was admin. to 7 patients with ulcerative colorectitis (6 men, 1 woman; aged 23-58; 5 of 7 without previous therapy; 2 of 7 previously resistant to sulfonamides and corticosteroids). Clinical responses were evaluated in terms of normalization of feces and voiding rhythm, reduction or disappearance of abdominal pain and fever, improvement of general status and radiologic and procto-sigmoidoscopic confirmation of regression of lesions. Overall clinical responses were tabulated as good in 5 of 7 cases, fair in 1 of 7, no response in 1 of 7. Side effects were limited to 2 cases of anorexia + mild, spontaneously reversing leukopenia (accompanied in 1 of 2 by mild erythrocytopenia, bromsulfalein retention and increase of indirect serum bilirubin). In 6 of 7 cases, treatment induced a marked reduction of lymphoplasmocytic infiltration of the intestinal mucosa, but reduction of circulating, monospecific immunoglobulin -G, -A and -M antibodies occurred in only 1 of 3 in whom these were demonstrable prior to initiating treatment.

7292 A NOTE ON SERUM COMPLEMENT ACTIVITY WITH PARTICULAR REFERENCE TO ULCERATIVE COLITIS. (E.) Fogel, B. J. (U. Miami Sch. Med., Fla.), W. A. Hook and E. Polish. Milit. Med. 132(4):282-285, 1967.

Mean serum complement activity was found to be low in 10 patients with acute glomerulonephritis (68.3 $C'H_{50}$/ml) and in 5 patients with lupus nephritis (53.4 $C'H_{50}$/ml), but normalized during convalescence in the former group. A normal range of 154-250 $C'H_{50}$/ml was obtained from 15 control subjects. High mean titers were noted in 5 children with acute rheumatic fever with carditis (333 $C'H_{50}$/ml) and in 10 children with residular valvular disease (222 $C'H_{50}$/ml). Normal or somewhat elevated levels were found in

3 older patients with rheumatoid arthritis, in 2 children with dermatomyositis and in 1 boy with anaphylactic purpura. In 16 patients (14 mo.-51 yr. of age) with active ulcerative colitis, mean serum level was 270 $C'H_{50}$/ml. and only two of these patients had values less than the control level. A 14 mo. child with a 1 yr. history of colitis who presented an initial serum complement level of 353 $C'H_{50}$/ml showed a significant reduction to 107 $C'H_{50}$/ml 1 yr. later during a course of septicemia due to Friedlander's bacillus. Studies in patients with acute nephritis and lupus nephritis evidenced some support that the lowered serum complement levels observed were the result of a fixation of complement to tissue antigen-antibody complexes. The normal or elevated complement levels seen in patients with active ulcerative colitis, however, may reflect the fact that an immunologic mechanism may be operative in the pathogenesis of the disease.

7293 AUTOANTIBODIES IN ULCERATIVE COLITIS. (E.) McGiven, A. R. (Monash U., Melbourne, Australia), T. Ghose and R. C. Nairn. Brit. Med. J. 2(5543):19-23, 1967.

Sera from 54 patients (23 males, 31 females; 10-82 yr. old) with ulcerative colitis and from 194 controls (consisting of 17 with malabsorption of various types, 16 with large intestinal carcinoma, 11 with amebiasis, 30 with pernicious anemia, 22 with autoimmune thyroiditis, 22 with systemic lupus erythematosus, 21 with rheumatoid arthritis, 35 with scleroderma and 20 normal healthy subjects) were studied. Sera from the ulcerative colitis patients included 10 giving immunofluorescent staining of human colon mucosa, 13 staining rat colon, and 17 with hemagglutination titers of 16 or more against rat feces antigen. In contrast with the immunofluorescence reactions against human and rat colon, hemagglutinating antibodies to rat colon antigens were no greater in incidence than in the 194 control sera. The positive sera reacted with other parts of the gastrointestinal tract, and no evidence of colon specificity was obtained. In addition, they were not specifically cytotoxic to human colon mucosa in tissue culture. Three ulcerative colitis sera contained antibodies against rat gastric parietal cells, 1 reacted with thyroid cytoplasm and none reacted with nuclei, adrenal or thyroid colloid. It is suggested that the autoantibodies that react with human intestinal mucosa are not themselves responsible for mucosal damage, but may reflect underlying cellular activity by autoimmune lymphoid cells.

7294 CUTANEOUS LESIONS IN ULCERATIVE COLITIS. (E.) Nugent, F. W. (Lahey Clin., Boston, Mass.) and M. Bulan. Lahey Clin. Found. Bull. 16(1):159-163, 1967.

7295 ULCERATIVE COLITIS AND CROHN'S DISEAS PATHOLOGICAL ASPECTS. (Nor.) Jørgensen, L. (Ulleval Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):916-918, 1967.

7296 SURGICAL TREATMENT OF ULCERO-HEMORRHAGIC: PARTIAL EXCISION OR TOTAL PROCTOCOLECTOMY? (Fr.) Waridel, D. (Surg. U., Lausanne, Switzerland). Praxis 56(20):683-689, 1967.

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7300 CLINICAL AND THERAPEUTIC PROBLEMS IN ULCERATIVE COLITIS. (Sp.) Dooner, H (U. Chile, Santiago) and V. Ide. Rev. Med. Chile 94(12):770-776, 1966.

7301 ETIOLOGICAL ASPECTS AND THERAPEUTIC PROBLEMS OF ULCERATIVE COLITIS. (It. (Rev.) Milone, P. (Turin Gen. Hosp., Italy). Minerva Med. 58(30):1309-1322, 1967.

7302 CHRONIC ULCERATIVE COLITIS IN MOTHER AND DAUGHTER. (E.) McEwan-Alvarado, G. (Scott & White Clin., Temple, Texas) and J. Bargen. Texas Med. 63(5):60-62, 1967.

7303 ULCERATIVE COLITIS. A REVIEW OF 172 CASES. (E.) Fahrländer, H. (U. Base Switzerland). German Med. Monthly 12(4):149-15 1967. [Transl. Deutsch. Med. Wschr. 91:1953, 1966.]

7304 INTESTINAL MICROFLORA IN NONSPECIFIC ULCERATIVE COLITIS PATIENTS BEFORE AN AFTER TREATMENT. (Rus.) Il'khamov, A. I. (Uzbek Inst. Postgrad. Med., USSR), B. F. Kadyr and T. D. Guliamov. Med. Zh. Uzbek. (2):25-27, 1967.

5 EXPERIENCES WITH NEOESERINE IN THE
FUNCTIONAL DIAGNOSIS OF THE PANCREAS.

r.) Kaczmareck, H. (Wittenberg Hosp.,
many). Z. Aerztl. Fortbild. (Jena) 61(3):
-134, 1967.

neostigmine test was given to 25
ients, 14 women, and 11 men, 9 with pan-
atitis, 3 with carcinoma of the pancreas, 1
n gallbladder carcinoma, 3 viral hepatitis
es, 5 having cholecystitis, and 4 in terminal
ndice. Freostigmine (1 mg) was inj. i.m. in
fasting patient at 8 A.M. after samples were
en for the determination of serum and urinary
lase levels, normal values, 8-32 and 16-128
lgemuth units, resp. Amylase conc. were
sured in serum and urine 30, 60, 90, and 120
after inj. of neostigmine. A pathological
ication occurred when (1) serum and urinary
lase increased over the normal values, (2)
um and urinary amylase increased or decreased
n elevated production of pancreatic amylase,
urinary amylase increased over the normal
ues with simultaneous fall of serum amylase,
normal amylase production with decrease
ow normal in serum and urine. Of the 9
ients with pancreatitis 7 showed positive
ction to the test (elevation of urinary and
um amylase above normal ranges) and 2 showed
ative reaction (amylase levels within normal
ges); 3 cases of carcinoma gave negative
ponses to the test, 1 case of gallbladder
cinoma had a negative test; of 3 patients
n viral hepatitis 2 were positive and 1 was
otful; of 5 cases of cholecystitis, 2 were
itive, 2 negative and 1 doubtful; 4 with
minal jaundice showed 1 positive, 2 negative
1 doubtful result. The max. amylase levels,
ardless of the results, occurred at 60 and 90
after neostigmine admin. The diagnosis of
creatitis was secured by medical history,
nical observation, laboratory examination,
finally by observation at operation and biopsy.
other pathologies were also carefully estab-
hed. No complications arose in the applica-
n of this test; no influence could be found on
diac rate, circulation time, or blood pressure.

6 CAPILLARY MICROSCOPY. ABNORMALITIES
IN CYSTIC FIBROSIS, CONGENITAL HEART
EASE, AND MONGOLISM.

(E.) Higashino, S. M.,
A. J. Moss (U. California Sch. Med., Los
eles). Amer. J. Dis. Child. 113(4):439-443,
7.

end-row capillaries of the nailbeds were
mined microscopically in 110 children and
lescents, of whom there were 20 normals
16 yr. old) and 23 with cystic fibrosis
20 yr. old). Using the classification of
st, morphology was considered to be normal if
e than 85% of the capillaries were composed
good and/or poor hairpin forms. Morphology
was assumed to be abnormal if the proportion of abnormal forms (which included single and double twist forms, Y-shaped, bizarre and tiny immature forms) exceeded 15%. The presence of horizontal subpapillary plexus was considered the most primitive form, also abnormal, and was categorized separately. Of 20 normals, 19 had more than 85% normal forms; the single exception had 82% normal forms. A horizontal subpapillary plexus was seen in only 2 children, both 3 yr. old. Of 23 with cytsic fibrosis, 19 (83%) had abnormal morphology and, of these, 9 (40%) had horizontal subpapillary plexus. The latter tended to increase with increasing severity of the disease. Of 14 classified as excellent, good or mild, 10 had abnormal morphology with horizontal subpapillary plexus in 2; of 9 with moderate or severe disease, all 9 had abnormal morphology and 7 had horizontal subpapillary plexus. Cyanosis was associated with an insignificant increase of abnormal capillary morphology, but with a significantly increased incidence of horizontal subpapillary plexus, thereby suggesting that local hypoxemia may have been a causative factor.

7307 THE COMPOSITION OF RECTAL MUCUS IN CYSTIC FIBROSIS.

(E.) Roelfs, R. E. (Univ. Hosp., Omha, Nebr.) G. E. Gibbs and G. D. Griffin. Amer. J. Dis. Child. 113(4): 419-421, 1967.

L-Fucose, mannosamine, galactosamine, glucosamine, N-acetylmannosamine, N-acetylgalactosamine and N-acetylneuraminic acid (methyl ester) in the hydrolysates of rectal mucus specimens were assayed by gas chromatography. The sugars were protected from decomposition during the course of chromatography by converting them to their trimethylsilyl ethers before inj. into the gas chromatograph. Rectal mucus specimens were obtained with a special triple-lumen tube from 11 cystic fibrosis patients (2-15 yr. old) and 19 nonfibrocystic control subjects (1-14 yr. old; 6 of whom had pneumonia, 2 nutritional anemia, 3 pharyngitis and croup, and 1 each spina bifida, fracture, ethanol intoxication, mental retardation, malabsorption, intertrigo, neck tumor and tonsillar hypertrophy). Thirty analyses were done for each compound. A significant increase in the content of fucose was found in mucus from cystic fibrosis subjects. The methyl group of L-fucose projects outward and is more hydrophobic than the CH_2OH groups in hexosamines; this causes a lowered aqueous solubility of cystic fibrosis mucus as compared to nonfibrocystic mucus, and may contribute to the higher viscosity of cystic fibrosis mucus. There was also a possibly significant difference in the L-fucose/N-acetyl-neuraminic acid ratio.

7308 ADULT MUCOVISCIDOSIS.

(E.) Goodman, D. H. (Good Samaritan Hosp., Phoenix, Ariz.). Ann. Allerg. 25(4):224-228, 1967.

Three patients 18, 23 and 51-yr.-old with a history of nasal polyposis in early childhood, all had markedly elevated levels of Na and Cl (130.9-197.0 mEq/liter) in the sweat. The 23-yr.-old Caucasian male exhibited all of the classical manifestations of mucoviscidosis: nasal polyposis, chronic sinusitis, advanced obstructive ventilatory disease of the lungs, duodenal ulcer, pancreatic insufficiency and digital clubbing. A 51-yr.-old white female had nasal polyposis, duodenal ulcer and bronchiectasis. The 18-yr.-old female exhibited a partial form of the disease: nasal polyposis, first observed at 4 yr. of age, chronic sinusitis and persistent cough. Detailed results of pulmonary function tests are given for each patient. Quantitative analysis of sweat Cl should be performed on any adolescent or adult with a history of nasal polyposis in childhood. Mucoviscidosis can exist in a relatively mild form, and pancreatic insufficiency is not an essential feature in every case. Approx. 15% of patients with mucoviscidosis have concurrent respiratory tract allergy, and 10% have nasal polyposis.

7309 RAPID METHOD FOR THE DETECTION OF CYSTIC FIBROSIS OF THE PANCREAS IN CHILDREN.

(E.) Saggers, B. A. (Queen Mary's Child. Hosp., Carshalton, Surrey, England), D. Lawson, J. Stern and A. C. Edgson. Arch. Dis. Child. 42(222):187-189, 1967.

A new method for measuring the Na conc. of unstimulated parotid saliva using a microdual Na electrode (which is a modification of a Jena microdual-pH electrode) is described. The electrode was placed in the upper region of the cheek next to the second molar tooth at the opening of Stensen's duct, and sterilization of the electrode was effected by wiping it with a pad soaked in 70% isopropanol. Normal subjects (31; 1-48 yr. old) gave parotid saliva Na levels from 3-15 mEq Na/liter (mean value, 5.9); cystic fibrosis heterozygotes (10; 25-49 yr. old), all of whom were parents of known homozygotes, had values between 4.5-12.0 mEq Na/liter (mean value, 5.69) and cystic fibrosis homozygotes (15; 1-19 yr. old) gave Na levels from 12-52 mEq Na/liter (mean value, 27.2). The difference between normals and cystic fibrosis homozygotes was highly significant. Approx. 4% of the values fell in an overlap range of 12-15 mEq Na/liter. No correlation was found between parotid saliva Na levels and ages of the test subjects. Cystic fibrosis heterozygotes did not show any significant difference in pNa values from normals. Studies are underway to adapt the size of the electrode for use in neonates.

7310 THE ABSORPTION OF HEMOGLOBIN BOUND IRON IN CASES OF MUCOVISCIDOSIS.

(Ger.) Strahm, H. W. (U. Clin. Bern, Switzerland). Arch. Kinderheilk. 175(3):270-279, 1967.

The absorption of Fe was studied in 13 children with mucoviscidosis, and in 13 other children of the same age distribution without infectious disease, anemia, or gastrointestinal disorder, as controls. The iron was ^{59}Fe incorporated in hemoglobin, admin. p.o. in doses proportional t body wt. The radioactivity of the hemoglobin was determined as well as that of the 5-day stoc collection. The 13 patients with cystic fibrosis had an av. Fe absorption of 19.5% (4.8-60.4%) and the 13 controls, 9.5% (0-35%). The distributions were such that the av. were not statistically significant. When the 3 highest absorptions were omitted from the results of these with fibrosis, the av. for the group became 12.8% which is within the normal range and therefore not significant. The absorption of ionic Fe and Fe bound to hemoglobin (as heme) has been measured and found to be the same in normal individuals. The higher hemoglobin conc. of those with pancreatic fibrosis (as compared to the normal) is still unexplained.

7311 ASSOCIATION OF PANCREATIC INSUFFICIENC AND CHRONIC NEUTROPENIA IN CHILDHOOD.

(E.) Burke, V. (Roy. Child. Hosp., Melbourne, Australia), J. H. Colebatch, C. M. Anderson and M. J. Simons. Arch. Dis. Child. 42(222):147-157, 1967.

Of 19 children presenting initially with 1 of th 2 main features of the title syndrome, 11 (5 boys, 6 girls) were found to have both features, e.g., 5 of 11 presenting with neutropenia and 6 of 8 presenting with malabsorption. Gastrointestinal features included steatorrhea, with a daily fat excretion of more than 5 g, in 9 of 11 patients; in these, fat globules were seen at some time on microscopy of the stools. In all patients with pancreatic insufficiency, there was no more than a trace of activity of trypsin, lipase or amylase in duodenal contents, and no particular enzyme was differentially reduced. In each of 3 in whom a biopsy of the small intestine was performed, mild inflammatory changes with blunting of the villi were seen in the mucosa. Giardia lamblia infestation was present in 1 case when duodenal biopsy was obtained. Hematological features included a persistently low neutrophil count, ranging from 0-200 cells/mm3 and contributing only 2-3% of the total WBC, in 7 of 11 children. Thrombocytopenia occurred in only 2, but anemia, which was corrected by admin. of Fe, occurred in all but 3 patients. Of 8 in whom bone-marrow aspirations were performed, 6 showed a deficienc of myeloid elements (bone-marrow hypocellularity and 1 of these also had megakaryocyte deficiency Radiological features of metaphysial dysostosis were found in 3 patients, while congenital megacolon also occurred in 1 case and in a cousi of 3 patients who were siblings. Familial studies showed that the father of 1 patient had mild neutropenia, but the mother's WBC were normal; another case had a sister with neutropen This syndrome of chronic neutropenia and pancreatic insufficiency is rare, but after excluding patients with cystic fibrosis, it

pears to be the most common cause of pan-
eatic insufficiency in childhood.

12 TREATMENT OF PANCREATIC EXOCRINE
INSUFFICIENCY: I. *IN VITRO* LIPOLYTIC
TIVITIES OF PANCREATIC LIPASE AND FIFTEEN
MMERCIAL PANCREATIC SUPPLEMENTS. (E.)
ulian, B. B. (Hahnemann Med. Coll., Philadelphia,
.), L. M. Singh, A. O. Mansfield, F. W.
irent and J. M. Howard. *Ann*. *Surg*. 165(4):
4-570, 1967.

pase activity was measured by the Johnson-
ckus modification of the Cherry-Crandall
thod. In addition to commercial preparations
onvertin, Converzyme, Cotazym, Dactilase,
zypan, Festal, Kanulase, Kutrase, Kuzyme,
pan, Pancreatin (X 1), Panteric Granules,
e-Gestive, Uticon, Viokase), 2 conc. lipase
tracts were used for comparison (crude pork
ncreatic lipase and Lipase P). Reaction
xture consisted of 3 ml distilled water, 2 ml
ive oil emulsion, 0.5 ml M/15 phosphate buffer
H 7.2), 1 ml lipase soln.; was incubated at
° for 18 hr.; reaction was terminated by
dition of 40 ml ethanol-ether (9:1) mixture.
mples and blanks were titrated to pH 10.65
th NaOH and the difference between the 2
lues was expressed as the Cherry-Crandall
pase U. Results with hog pancreatic lipase
d canine pancreatic juice showed that
drolysis of olive oil substrate under these
nditions was directly proportional to the
zyme conc., up to 10 U. On an equal wt.
sis, the highest hydrolytic activity was
own by Cotazym, Lipan, Panteric Granules, and
okase; lowest by Convertin, Kanulase, Kutrase,
zyme. Human pancreatic lipase from a patient
th a pancreatic fistula contained 160 U/ml.
nety-six g Festal or 34 g Cotazym would be
quired to completely replace the pancreatic
cretion in 1 day. The bile salt, Na tauro-
olate, increased lipase activity, but the
fect was diminished at high conc. All
eparations were inactivated at pH 2, and
owed max. activity at neutral and alkaline pH.
pase activity was increased slightly (5.5-6.8 U)
the presence of human serum albumin (10 mg/ml).
ypsin (10 mg/ml) slightly decreased lipolytic
tivity (7.3-5.9 U/ml). It is suggested that
e addition of bile salts to these preparations
d enteric coating might be advantageous.

3 TREATMENT OF PANCREATIC EXOCRINE
INSUFFICIENCY: II. EFFECTS ON FAT
SORPTION OF PANCREATIC LIPASE AND FIFTEEN
MMERCIAL PANCREATIC SUPPLEMENTS AS MEASURED BY
31 TAGGED TRIOLEIN IN THE DOG. (E.) Giulian,
B. (Hahnemann Med. Coll., Philadelphia, Pa.),
Mitsuoka, A. O. Mansfield, J. E. Trapnell,
A. Seddon and J. M. Howard. *Ann*. *Surg*.
(4):571-579, 1967.

n and accessory pancreatic ducts were ligated
d divided without interruption of blood supply
to gland or duodenum. Because of effects on fat absorption, in latter operations a complete separation of the head of the pancreas from the duodenum was performed and a leaf of omentum inserted between and wrapped around the duodenum, providing reliable exocrine occlusion. Absorption studies were performed over 3 mo. *In vivo* studies of ^{131}I-triolein uptake were made before and after ligation and division of pancreatic ducts. Effects of 15 pancreatic supplements (Convertin, Converzyme, Cotazym, Dactilase, Enzypan, Festal, Kanulase, Kutrase, Kuzyme, Lipan, Pancreatin (X 1), Panteric Granules, Pro-Gestive, Uticon, Viokase) and of 2 lipase preparations (crude pork pancreatic lipase and Lipase-P) were measured in respect to: normal preoperative uptake; control postoperative uptake; uptake within 4 days of the latter, with addition of pancreatic supplements. The different preparations exhibited wide variation in effects. *In vivo* results generally correlated with previous *in vitro* studies. Best results were obtained with Cotazym, Converzyme, Festal and Panteric Granules, the latter 3 being enteric-coated. The other preparations showed little if any ability to increase fat digestion as measured by this method. No single preparation always caused an increase in uptake, but preparations giving 'good' results usually exerted a beneficial effect on lipid absorption.

7314 REGENERATIVE AND COMPENSATORY PHENOMENA IN PANCREAS AFTER RESECTION. (Rus.)
Polyak, R. I. (Med. Inst., Chernovtsy, USSR). *Biull*. *Eksp*. *Biol*. *Med*. 62(12):95-99, 1966.

Dogs were divided into 5 groups according to type of pancreatic resection: Group 1, 16 animals, resection of the terminal portion of the gland; Group 2, 12 animals, resection of the central portion of the pancreas (corresponding to the head of the gland in man) with ligation and resection of the excretory duct; Group 3, 9 animals, resection of the central portion as well as some of the terminal portion; Group 4, 12 animals, removal of the pancreas with preservation of the portion closest to the duct; and Group 5, resection of the pancreas with subsequent suture of the stump into the lumen of the jejunum. Immediately after surgery, the blood sugar content was elevated to 160-200 mg%, and after the third-fourth day it decreased to 120-140 mg%. Other blood parameters were normal. After double loading with sugar (2 g glucose/kg body wt.), the graph of blood sugar did not always resemble its initial form. In general, glycemia curves during the postsurgical period differed from the basic, initial curve by a greater increase after the second glucose loading, and a slower decrease thereafter; this is indicative of functional insufficiency of the islands of Langerhans. However, after surgery the glycemic curves approached normality, and this was evidence of compensatory and regenerative capacity of the islands of Langerhans in the residual pancreas. In Group 2 there were immediate postsurgical complications (peritonitis, pancreaticonecrosis). A study of pancreatic exocrine function showed that removal of the final portions of the organ were not accompanied by a disturbance of the ability to absorb and assimilate fats and proteins. In animals of Groups 2 and 3 there was evidence of disturbed absorption and digestion of fats and proteins; this was shown by the excretion of many drops of neutral fats and undigested muscular fibers in the feces. In animals of Group 5, fats and proteins were poorly metabolized and the feces were markedly altered (light in color, liquid in nature, larger in amount with a large amount of undigested muscular fibers and fat droplets); this condition improved later. This is also evidence of many compensatory and regenerative processes. The most unfavorable results accompanied subtotal resection, i.e., fatty necrosis (causing death in 3 animals), purulent inflammation, and cyst-like cavities in regions of focal destruction of survivors. There were atrophic changes and the development of connective tissue in the residual pancreas (this increased with time) in animals of Groups 2 and 3; thus, pancreatic function was not restored. In dogs in which the pancreatic stump was peritonized with omentum and then isolated from the intestinal lumen, there was evidence of pronounced atrophy of the acinar tissue and proliferation of connective tissue 2-3 mo. after surgery. Dogs with a pancreatico-intestinal anastomosis showed only slight swelling of the interlobular connective tissue layers and an increase in acinar tissue. This demonstrated the compensatory capacity of the pancreas.

7315 PHARMACOLOGIC STUDY OF RESIDUAL EXOCRINE PANCREATIC FUNCTION FOLLOWING CEPHALIC DUODENOPANCREATECTOMY. (EXPERIMENTAL CLINICAL STUDY.) (It.) Mezzacapo, B. (Civil Hosp., Brescia, Italy). Minerva Chir. 22(1): 42-48, 1967.

In 3 men (aged 37, 50 and 52 yr.) in whom the remaining pancreas was stimulated by i.v. inj. of secretin (2 of 3) or i.m. inj. of neostigmine (1 of 3), 17 mo., 18 and 20 days, resp., after amputation of the head of the gland in the presence of pancreatic carcinoma, exocrine pancreatic function was entirely within normal limits. In a fourth man with pancreatic cancer (aged 53 yr.), who was operated in the same way in the presence of generalized sclerosis of the pancreas (found at the time of operation), a similar response to secretin could not be elicited 9 mo. after surgery. It is concluded that residual pancreatic exocrine function after this type of surgery can be sufficient to meet normal digestive demands in the absence of stenosis at the orifices or parenchymal damage due to recurrence in situ or chronic pancreatitis. It is also concluded that the operation of choice terminates with a pancreatic-jejunal anastomosis, further reinforced by muco-mucosal suture.

7316 ADIPOSE ATROPHY OF THE EXOCRINE PANCREAS. (E.) Walters, M. N-I. (U. Western Australia, Perth). J. Path. Bact. 92(2):547-557, 1966.

Blocks of human tissue, from head, body, and tail of pancreas obtained from 200 almost consecutive necropsies on adults, were fixed with 4% neutral formaldehyde and impregnated with paraffin. Experimental rats (150-300 g) had the duct to the splenic segment ligated within 1 cm of the splenic hilus and 260 mice received introduction of reovirus type III pancreatitis. Experimental biopsies were treated as above. Of 200 necropsies, 60% showed significant fatty replacement of the pancreas, while 30% showed this to a minor degree. The lesion was commonly associated with diabetes mellitus, hepatic and cholecystic disease, obesity, degenerative vascular disease, or dietary insufficiency, although no conclusive etiologic associations were made. Studies on animals suggested several likely sources of fatty tissue: mesenchymal lipoblasts, cells of reticulin stroma, mononuclear cells derived from lymphoreticular taches laiteuses, degenerated acinocytes, multiplication of existing pancreatic fat deposits, and possibly a totipotent ductular reserve cell. Infiltration usually followed acinocytic atrophy and ductular-cell proliferation. It is suggested that some form of ductal obstruction may be the major pathological basis of adipose replacement of the exocrine pancreas despite several possible modes of lipogenesis available to it. Regardless of cause, in the presence of acinocytic atrophy, adiposity remains the final common morphological pathway available to the pancreas.

7317 ALLOTRANSPLANTATION OF THE PANCREAS IN DOGS. (E.) Ota, K. (Tokyo U. Sch. Med., Japan), S. Mori, M. Nobori and T. Inou. J. Surg. Res. 7(5):207-214, 1967.

Of 60 dogs used, 30 were donors and 30 recipients (10 controls received no anti-rejection drugs). After allotransplantation (modified after DeJode), transfusion was with donor blood and postoperative antibiotic therapy consisted of i.v. admin. of 250 mg Signemycin (83 mg oleandomycin phosphate plus 167 mg tetracycline hydrochloride per vial) daily for 3 days. Azathioprine was admin. i.v. at 6 mg/kg on the day of operation and this dose was repeated p.o. daily. Functioning of pancreas transplant was evaluated by the blood glucose method of Hagedorn and Jensen. The controls lived an av. of 10 days; the azathioprine group 22 days. Death was caused by rejection in 6 controls and 6 azathioprine dogs. In 5 of these 12, the last fasting blood glucose level was greater than 150 mg/100 ml. This suggests that hyperglycemia is a terminal, rather than initial, sign of rejection. Histological observation showed the control group to be characterized by acute rejection resembling acute pancreatitis. Chronic

jection manifested by interstitial fibrosis
s found in the azathioprine group. It is
ncluded that azathioprine is effective in
ppressing the acute rejection process but was
able to prevent fibrosis.

18 A METHOD FOR THE DETERMINATION OF
TRYPSIN AND CHYMOTRYPSIN IN FECES BY
ANS OF AMINO ACID-P-NITROANILIDES. (Ger.)
llig, F. (U. Heidelberg, Germany) and W.
rber. Z. Gastroent. 5(1):33-36, 1967.

ces (2 g) were homogenized in 5- or 10-times
lution with buffer soln. at 0°C. Only
mples of the same or preceding day were used.
r the determination of trypsin, 0.5 ml of the
ool homogenate was mixed with 5 ml Tris
ffer, pH 7.8, containing 0.025 M $CaCl_2$ at
°C; the reaction time was 15 min. at 25°C in
waterbath with the addition of 0.1 ml 0.55 M
α-benzoyl-arginine-p-nitroanilide as substrate;
e reaction was terminated with the addition
2.8 ml 40% trichloracetic acid. For the
termination of chymotrypsin, 0.5 ml of the
ool homogenate was mixed with 3 ml of Tris
ffer, pH 7.5 containing 0.66 M $CaCl_2$ at 25°C;
action time was 1 hr. in a water bath at 25°C
ter addition of 0.05 ml 0.35 M N-succinyl-L-
enylalanine-p-nitroanilide as substrate; the
action was terminated with 1.8 ml 40% tri-
oracetic acid. In both reactions, the pro-
ct, p-nitroaniline, cannot be measured
rectly by photometry due to suspended matter;
itroaniline is converted into a red azo dye
ter precipitation of suspended solids by
chloracetic acid; the azo dye is then measured
photometry at 546 nm. Determinations of
ypsin and chymotrypsin were made in samples
om 64 subjects with normal pancreatic glands
no history of pancreatic disease. A
fference in fecal conc. of the enzymes accord-
to sex or age did not occur. Trypsin
μg) and 74 μg of chymotrypsin/g feces
t wt.) are regarded as the lower limits of
normal range. The arithmetic mean of the
ypsin determinations was 167 μg/g stool (wet.
), and of the chymotrypsin measurements,
μg/g stool (wet wt.). Samples of the same
ol preparations stored at 5°C and at 25°C had
y a 2% loss in trypsin activity after 5 days
5°C but a 63% loss after 5 days at 25°C. The
s of chymotrypsin activity after 5 days at
C was over 80°. The two substrates are
yme-specific when no enzyme inhibitors are
sent.

9 INJURY TO THE PANCREAS RESULTING FROM
BLUNT ABDOMINAL TRAUMA WITH A REVIEW
NINE CASES. (E.) King, E. G. (U. Alberta
p., Edmonton, Canada) and A. B. Jones.
erta Med. Bull. 32(2):47-53, 1967.

0 TREATMENT OF POSTOPERATIVE PANCREATIC
FISTULA. (E.) Tarasidis, G. C. (VA Hosp., Butler, Pa.) and R. W. Hipsley. Amer. Surg. 33(5):425-428, 1967.

7321 CARCINOMA OF HEAD OF PANCREAS. (E.) Denman, F. R. (Texas Med. Ctr., Houston). Texas Med. 63(5):69-71, 1967.

7322 EARLY DIAGNOSIS OF CARCINOMA OF THE PANCREAS. (Jap.) Ozaki, H. (Nat. Cancer Ctr. Hosp., Tokyo) and K. Ishii. Iryo 21(1):33-41, 1967.

7323 PANCREATIC CARCINOMA IN THE DOG. (E.) Anderson, N. V. (U. Minnesota Coll. Veterinary Med., St Paul) and K. H. Johnson. J. Amer. Vet. Med. Ass. 150(3):286-295, 1967.

7324 CHANGES IN THE SERUM ASPARTATE AND ALANINE TRANSAMINASE, PHOSPHOMONOESTERASE I AND FRUCTOSE 1,6-DIPHOSPHATE IN THE PRE-OPERATIVE AND POSTOPERATIVE PERIOD IN PATIENTS WITH CHOLELITHIASIS AND CARCINOMA OF THE PANCREAS. (Bul.) Prodanov, K. (Cent. Biochem. Lab., Sofia) and D. Dimitrov. Khirurgiia (Sofia) 20(1):22-25, 1967.

7325 CLINICAL SYNDROMES ASSOCIATED WITH TUMORS OF THE PANCREAS. (E.) Walsh, J. H. (Cornell U. Med. Coll., Ithaca, N. Y.) and M. H. Sleisenger. DM, June, 1967, 30 pp.

7326 CYSTADENOMA AND CYSTADENOCARCINOMA OF THE PANCREAS. (Fr.) Van Damme, L., J. Van Damme, A. Froehlich and J. Gérard. Acta Gastroent. Belg. 30(3):225-240, 1967.

7327 ELECTRON MICROSCOPE STUDIES OF THE PANCREAS AFTER ADMINISTRATION OF CONTRYKAL (KALLIKEIN-TRYPSIN INACTIVATOR). (Ger.) Tschiftschiisky, S. D. (Humboldt U., Berlin), H. David, I. Uerlings and I. Marx. Deutsch. Z. Verdau. Stoffwechselkr. 26(5-6): 242-251, 1966.

7328 PANCREATIC EXOCRINE FUNCTION IN AFRICAN PATIENTS. (E.) Banwell, J. G. (Mulago Hosp., Kampala, Uganda) and J. Campbell. Trans. Roy. Soc. Trop. Med. Hyg. 61(3):390-398, 1967.

7329 LABORATORY STUDY OF EXOCRINE PANCREAS. (Fr.) Bartos, V. Tunisie Med. 44(5): 303-315, 1966.

7330 PANCREATIC SCINTIGRAPHY. (Fr.) Leger, L. (Cochin Hosp., Paris), J. C. Roucayrol, G. Boury and J. P. Nouel. Maroc Med. 47(500):230-234, 1967.

7331 TOTAL PANCREATECTOMY. ELEVEN-YEAR SURVIVAL. (E.) Davila, J. E. (Prof. Hosp., San Juan, Porto Rico). J. Abdom. Surg. 9(6):162-163, 1967.

7332 LIVER INVOLVEMENT IN CYSTIC FIBROSIS IN CHILDREN. (Ger.) Sitzmann, F. C. (U. Clin. Erlangen-Nurnberg, Germany) and U. Stephan. Arch. Kinderheilk. 175(3):263-270, 1967.

7333 TREATMENT OF PSEUDOCYSTS OF THE PANCREAS. REPORT OF A DOUBLE CYST. (Ger.) Eckstein, H. B. (Queen Mary's Child. Hosp., Carshalton/Surrey, England). Z. Kinderchir. 4(2):162-165, 1967.

7334 WEBER-CHRISTIAN SYNDROME OF PANCREATI ORIGIN. (E.) De Graciansky, P. (St. Louis Hosp., Paris). Brit. J. Derm. 79(5) 278-283, 1967.

See also abstract nos.: 6647,6659,6686,6700,6702,6705,6715,6716,6717,6718,6736,6847,6848,7208,7649

5 ACUTE PANCREATITIS ASSOCIATED WITH AN INTRALUMINAL DUODENAL DIVERTICULUM.

) Nance, F. C. (Louisiana State U. Sch. Med.,
Orleans), J. Cocchiara and J. L. Kinder.
troenterology 52(3):544-547, 1967.

l-yr.-old Negro man complained of mild inter-
tent epigastric pain and occasional nausea
3 mo., with no history of excessive alcohol
ake. Physical examination was normal, there
no evidence of wt. loss, the abdomen was
with no palpable masses and initial labor-
y studies were normal. On the fifth day he
plained of severe epigastric pain, nausea
vomiting and revealed minimal epigastric
derness and a soft abdomen. Studies showed:
17,850/ml with a shift to the left of poly-
phonuclear cells; hematocrit 48%; serum
lase 280 Somogyi U; lipase 4.4; serum Ca
mEq; serum P 2.72 mg/100 ml. Subsequent
and P levels were normal. Clinical diagnosis
pancreatitis was made. Symptoms subsided
values returned to normal on conservative
rapy. On day 45, he had severe epigastric
n, nausea and vomiting; there was moderate
gastric tenderness but a soft abdomen;
perature was normal; serum amylase was
vated to 310 U. Symptoms continued for 24 hr.,
siding on conservative therapy. Initial X-ray
upper gastrointestinal tract was normal except
a spasm of the duodenum, attributed to pan-
atitis. A second X-ray showed an intraluminal
erticulum in the second and third portion of
duodenum, and this filled with Ba. The
ximal duodenum was enlarged and gastroscopic
mination and cholecystogram were normal.
aratomy revealed an enlarged duodenum with a
tinct decrease in size in the area of the
ulla of Vater. An anterior duodenotomy per-
med at this point revealed a large intra-
inal diverticulum extending distally from
ampulla of Vater and attached to the lateral
denal wall. The diverticulum was excised
m both attachments, the mucosal defect re-
red, the duodenum closed transversely. The
creas was firm, swollen and indurated; gall-
dder, common bile duct and biliary tree were
mal; the pancreatic duct could not be vis-
ized. Recovery was uneventful.

6 SELECTIVE SURGERY FOR RELAPSING PANCREATITIS.

(E.) Keddie, N. C.
rk Hosp., Manchester, England). Brit. J. Surg.
2):106-109, 1967.

nsduodenal sphincterotomy was performed and
y sutures inserted into the margins of the
ision in the sphincter to hold it open. The
fice of the pancreatic duct was sought below
orifice of the common bile duct. A catheter
inserted into the orifice for 2-3 cm and
l 50% Hypaque soln. was inj. via the catheter.
ssure of inj. was reduced by the high resis-
ce to flow within the catheter. Pancreato-
ms were carried out on patients undergoing
surgery for relapsing pancreatitis (35 of 200). In 32 of 35, sphincterotomy was the initial operation. Relief on the basis of sphincterotomy could be predicted on the basis of X-ray appearance correlated with follow-up of 1-10 yr. Prediction was correct in 75%. One died from postoperative pancreatitis. Pancreatographic findings were: normal (6); dilatation of main duct (8); tortuosity and multiple narrowing of main duct (2); incomplete filling of main duct (9); abnormal filling with pooling of dye (8); acinar filling (2). Only the latter 2 groups yielded successful predictions. Surgical procedures recommended for the above findings were, resp.: care to exclude other diseases; sphincterotomy; Puestow procedure; sphincterotomy and excision of tail with retrograde draining into loop of jejunum.

7337 MANAGEMENT AND PROGNOSIS OF ACUTE PANCREATITIS.

(Ger.) Asang, E. (City Hosp., Munich, Germany). Lebensversicher. Med. 19(3):59-63, 1967.

Comparison is made between the treatment of acute pancreatitis in two periods: yr. 1954-1958 inclusive, and 1959-1963 inclusive. The treatment during the 2 periods was basically the same, the so-called active conservative therapy of Nordmann. The chief difference was the use of Trasylol in the second period. Mortality in the first period was 39.5% and in the second, 9.9%. However, when primary and untimely laparotomies were performed on patients with pancreatitis mortality in the first period was 65.5% and in the second period, 63.6%. This indicates the extreme danger of general upper abdominal surgery during acute pancreatitis. The performance of primary conservative right-sided operation in the first period resulted in a mortality of 33.3%, in the second period of 3.6%. These improvements may not have been entirely due to Trasylol because the incidence of complications in cases of pancreatitis decreased from 21.5% in the first period to 11% in the second. The incidence of postoperative pancreatitis in a total number of 4786 stomach and biliary operations 1955 in the first and 2831 in the second period declined from 7.2% to 5.8% and the mortality rate from 1.5% to 0.4%.

7338 SELECTIVE PROPHYLAXIS OF POSTOPERATIVE PANCREATIC NECROSIS.

(Ger.) Hoferichter, J. (U. Erlangen-Nuremberg, Germany). Chirurg 38(5):233-236, 1967.

Postoperative hemorrhagic necrotizing pancreatitis a serious complication of upper abdominal surgery almost without exception terminates fatally. Routine use of proteinase inactivators is not possible: (1) Postoperative necrosis of the pancreas is relatively rare. (2) The action of proteinase inactivators is not sufficiently known. (3) The financial outlay, on account of the high dosages required, is considerable. A selection of patients is necessary. The indications for this are: (1) Trauma of the pancreas, (2) Possibility of reflux of bile or an intraglandular activation of enzymes. These indications are present in all partial resections of the pancreas for whatever cause, in manipulations of the papilla, and in any operative or other manipulation of the biliary tract which might result in reflux into the pancreas, as well as in cases of fulminating or florid pancreatitis. The prophylaxis must be begun during the operation with 50,000 U of Trasylol. During the course of the operation and for 2-3 days afterward 100,000 U/day are admin. In 1000 upper abdominal operations in the last 3 yr., in which selective prophylaxis was practiced, no case of necrotizing pancreatitis occurred. In 1500 upper abdominal operations in the 7-yr. period before that in which 1500 such operations were done without prophylaxis, there were 9 instances of fatal necrotizing pancreatitis.

7339 THE INFLUENCE OF HYPOTHERMIA UPON THE DEVELOPMENT OF EXPERIMENTAL PANCREATITIS. (Ger.) Eichelter, P. *Klin. Med. (Wien)* 22(4): 179-187, 1967.

A total of 50 dogs (9-27 kg) were used to study the effects of hypothermia upon experimental pancreatitis. The dogs were fasted for 12 hr., anesthetized and kept under artificial respiration. The duodenum was transected at the pylorus and 4 cm distal to the duct of Santorini; both ends of the duodenum were closed and the continuity of the gastrointestinal tract was reestablished by anastomosis of the pylorus with the distal duodenum. The common bile duct was doubly ligated. A shunt between the carotid artery and jugular vein through a long polyvinyl catheter, placed in water (10-15°C), reduced the rectal temperature of 22 dogs in less than 2 hr. to 28°C, which was maintained for an av. of 19 hr. Three of these dogs had body temperature of 28°C within less than 4 hr. after formation of the blind duodenal loop. The temperature of the other 19 dogs was reduced from 4.5-10 hr. after construction of the blind loop. All 13 of the control dogs died in 12-31 hr. of acute hemorrhagic pancreatitis. The av. value of diastase in the peritoneal fluid was 2245 U. The 3 dogs with temperature reduced within less than 4 hr. did not develop pancreatitis. These dogs were reoperated and the gastroduodenal region reconstructed and the ligatures removed; their temperature was brought back to normal by placing the polyvinyl shunt tube in water at 42°C, after which they received saline infusions and antibiotics. These dogs survived for 50, 67, and 72 days until they were killed for examination. These animals had 276-310 U of diastase in the peritoneal fluid. Of the 19 dogs with a rectal temperature of 28° reached 4.5-10 hr. after surgery, 11 lived longer than 2 days, 6 from 9-72 days before being sacrificed. Diastase values were intermediate. Nine dogs in this group died of complications such as wound infection, pneumonia, and pulmonary emboli.

7340 NATURAL VARIATION IN EXPERIMENTAL HEMORRHAGIC PANCREATITIS. (E.) Williams, L. F., Jr. (Boston City Hosp., Mass.) and J. J. Byrne. *Surg. Gynec. Obstet.* 124(3): 531-535, 1967.

The incidence of severe hemorrhagic pancreatiti as well as death was compared between a group o 88 adult mongrel dogs with closed duodenal loop obstruction with biliary tract exclusion (Pfeff preparation) and a group of 59 dogs with main pancreatic duct infusion with 5 ml of duodenal loop fluid obtained from a Pfeffer preparation infused at less than 600 ml of H_2O. Since both groups are identical in all respects, pancreati duct infusion allows evaluation of the hemorrha pancreatitis component of the Pfeffer preparati in the absence of strangulation obstruction. Analysis of comparative data between the 2 grou revealed a variation in the degree of hemorrhag pancreatitis that was related not only to the nature of the infusate, but also to an undefine normal variation in response by any given dog. Severe changes occurred in 67.6% of the Pfeffer group dogs and in 67% of the pancreatic duct infusion preparations. The death rate at 24 hr in pancreatic duct infusion dogs was 35.8%, whi was statistically no different than results in the Pfeffer dogs. There was a tendency for mor severe pancreatitis to occur in the pancreatic duct infusion dog when the Pfeffer dog had severe pancreatitis, but the relationship was n linear. It is suggested that the presence of individual animal variation previously referred to, at least in the dog, makes evaluation of therapy when based upon small numbers of dogs difficult and frequently meaningless.

7341 POSTGASTRECTOMY PANCREATITIS. EXPERIMENTAL ASPECTS. (Sp.) Filgueira, L. (Fac. Med., Montevideo, Uruguay), U. Larre Borg and A. Del Campo. *An. Fac. Med. Montev.* 50(3/4 278-286, 1966.

Four groups of dogs were subjected to partial gastrectomy with a precolonic gastroenteroanastomosis from the lesser to the greater curvatur Group 1 received no other treatment; Group 2 wa also subjected to traumatization of the pancrea Group 3, to total occlusion of the afferent loo Group 4, to partial occlusion of the afferent loop. At 48 hr., the pancreas was normal in 9 of 9 dogs in Group 1, as were values for serum pancreatic U, determined by Wohlgemuth's method In Group 2, 10 of 11 had developed acute pancreatitis (hemorrhagic in 4 of 10) and serum pancreatic U were above normal levels in 2 of 8 studied from this point of view. In Group 3, 9 of 12 had developed pancreatitis (acute in 6 of 9; hemorrhagic in 4 of 6); serum pancreatic U were above normal levels in 4 of 7 studied from this point of view; 5 of 12 died within 24 hr. and 2 of 12 were in a severely deteriorated sta In Group 4, 4 of 10 had developed acute pancreatitis (hemorrhagic in 2 of 4) and the pancre were normal in 6 of 10. Serum pancreatic U wer above normal levels in 1 of 5 studied from this

t of view. It is concluded that trauma to
pancreatic parenchyma and occlusion of the
rent loop should both be considered as po-
ially serious risks during gastric surgery.

POSITION OF SURGERY WITH RESPECT TO
CHRONIC PANCREATITIS. (Fr.) Doutre,
. and J. Perissat. J. Med. Bordeaux 144(4):
547, 1967.

ACUTE HEMORRHAGIC PANCREATITIS DURING
PREGNANCY AND THE PUERPERIUM ASSOCIATED
THIAZIDE THERAPY. (E.) Menzies, D. (U.
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PANCREATITIS. CURRENT ANALYSIS AND
REVIEW OF 71 CASES. (E.) de Foïard-
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THE SURGICAL TREATMENT OF CHRONIC
PANCREATITIS. (Rus.) Petrov, B. A.
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HYPERLIPEMIA IN ACUTE PANCREATITIS.
METABOLIC STUDIES IN A PATIENT AND
NSTRATION OF ABNORMAL LIPOPROTEIN-TRIGLY-
DE COMPLEXES RESISTANT TO THE ACTION OF
PROTEIN LIPASE. (E.) Kessler, J. I.
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arza and S. Mishkin. Amer. J. Med. 42(6):
976, 1967.

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OF LEGAL MEDICINE AND DIAGNOSIS. (Fr.)
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314, 1967.

7348 STEROID PANCREATITIS. (Ger.)(Rev.) Gülzow, M. (U. Clin. Rostock, Germany). Z. Ges. Inn. Med. 22(6):161-165, 1967.

7349 ACUTE PANCREATITIS AND PREGNANCY. (Ger.) Poradovský, K. (Fac. Med., Kosice, Czechoslovakia), K. Tomoriová, S. Zidek, R. Klima and M. Kovačik. Z. Ges. Inn. Med. 22(8):233-237, 1967.

7350 YES OR NO FOR INTRAVENOUS TRASYLOL TREATMENT OF ACUTE PANCREATITIS. (Ger.) Wanger, F. (Canton Hosp., St. Gallen, Switzerland). Schweiz. Med. Wschr. 97(23):745-751, 1967.

7351 COMPLICATIONS OF ACUTE PANCREATITIS. UNUSUAL SEQUELAE IN 100 CASES. (E.) Lukash, W. M. (Nat. Naval Med. Ctr., Bethesda, Md.). Arch. Surg. (Chicago) 94(6):848-852, 1967.

7352 PANCREATITIS AND SYNDROMES OF PANCREATIC DISORDERS IN THE CHILD. (Fr.) Malafosse, M. (Child. Hosp., Paris), J. Bienaymé, B. Caille and C. Piussan. Sem. Hop. Paris 43(21): 1399-1417, 1967.

7353 RECURRENT ACUTE PANCREATITIS ASSOCIATED WITH SYSTEMIC LUPUS ERYTHEMATOSUS. REPORT OF A CASE. (E.) Sparberg, M. (Wilford Hall USAF Hosp., Lackland AFB, Texas). Amer. J. Dig. Dis. 12(5):522-526, 1967.

7354 ASPECTS OF THE MANAGEMENT OF ACUTE PANCREATITIS. (E.) Elmslie, R. G. (Prince Henry Hosp., Sydney, Australia). Med. J. Aust. 1(5):211-214, 1967.

7355 CLINICAL STUDIES ON ACUTE PANCREATITIS. AN ANALYSIS OF 65 CASES. (E.) Lee, C. (Seoul Nat. U.,), W. Lee and S. S. Hahn. Korean J. Intern. Med. 10(2):109-115, 1967.

7356 THE SEPARATION OF GC-PHENOTYPES AND GC-ALLELES IN SOME DISEASES (DIABETES MELLITUS, DAMAGE TO LIVER PARENCHYMA, PSORIASIS VULGARIS). (Ger.) Jörgensen, G. (U. Gottingen, Germany) and A. Hopfer. Humangenetik 3(4): 273-276, 1967.

The functional significance of group-specific factors (Gc-factors) is wholly unknown in spite of an extensive literature. Differences in the distribution of Gc phenotypes and Gc alleles in various populations are also unknown. In the first instance their possible connection with common diseases, especially infectious diseases, comes to mind. The determination of Gc factors was done on the sera of a group of 213 patients with liver disorders, acute and chronic hepatitis and also cirrhosis. As controls a group of 1733 healthy individuals furnished sera. The technic of Hirschfeld with the aid of agar gel immunoelectrophoresis was employed. The specific anti-Gc horse sera were prepared commercially, duplicate preparations made and stained with 5% amido black soln. for purposes of lasting diagnosis and documentation. The possibilities with 2 alleles (Gc^1 and Gc^2) are 3 diploid phenotypes (1-1, 1-2, and 2-2). The number n of the control group was 1733; phenotype 1-1: observed number (0), 901 = 52%; calculated (C), 894.75 = 51.63%; phenotype 1-2: 0, 688 = 39.70%, C, 701 = 40.45%; phenotype 2-2: 0, 144 = 8.30%, C, 137.25 = 7.92%. Frequency Gc^1 allele (controls), 0.7185; Gc^2 allele (controls), 0.2815; Chi square (controls), 0.6166; $P_{(m = 2)}$ (probability with 2 degrees of freedom) about 0.75. For the sera of patients with liver disorders: n = 213; phenotype 1-1: 0, 119 = 55.87%; C, 115.7 = 54.33%; phenotype 1-2: 0, 76 = 35.68%, C, 82.6 = 38.76%; phenotype 2-2: 0, 18 = 8.45%, C, 14.7 = 6.91%. Frequency: Gc^1 allele, 0.7371, Gc^2 allele, 0.2629; Chi square, 1.343; $P_{(m = 2)}$ about 0.51. The differences between the normal group and the group with liver disease are not statistically significant.

7357 THE DISTRIBUTION OF HAPTOGLOBIN PHENOTYPES AND HAPTOGLOBIN ALLELES IN CERTAIN DISEASES (DIABETES MELLITUS, LIVER PARENCHYMAL DAMAGE, AND PSORIASIS VULGARIS). (Ger.) Jörgensen, G. (U. Gottingen, Germany) and U. Hopfer. Humangenetik 3(4):277-281, 1967.

The relationship of serum haptoglobins to liver disease was examined in 183 persons with a diversity of hepatic pathologies: 60% had acute, subacute or chronic hepatitis; 10% had cirrhosis; 15% suffered from secondary hepatitis and 5% had terminal jaundice. Control sera were furnished by 685 healthy people. Haptoglobins were determined by starch gel electrophoresis according to Smithies by the modification of von Baitsch. There were 2 Hp alleles and therefore 3 phenotypes: 1-1, 1-2, and 2-2; n = 685, the number of the controls; phenotype, 1-1: observed (0), 114 = 16.64%, calculated (C), 112.8 = 16.47%; phenotype, 1-2: 0, 328 = 47.88%, C, 330.4 = 48.23%; phenotype, 2-2: 0, 243 = 35.48%, C, 241.9 = 35.31%. Frequency: Hp^1 allele, controls, 0.4058; Hp^2 allele, 0.5942; Chi square = 0.0347; $P_{(m = 2)}$ (probability with 2 degrees of freedom) about 0.98. n = 183, the number of hepatic patients; phenotype, 1-1: 0, 37 = 20.22%; C, 33.3 = 18.17%; phenotype, 1-2: 0 82 = 44.81%; C, 89.5 = 48.91%; phenotype, 2-2: 0 64 = 34.97%; C, 60.3 = 32.92%. Frequency: Hp^1 allele, 0.4262; Hp^2 allele, 0.5738. Chi square 1.286 $P_{(m = 2)}$ about 0.53. There was no statistically significant difference between the controls and the 183 persons with hepatic disease.

7358 STUDIES ON THE PLASMIN SYSTEM IN THE LIVER OF ANIMALS WITH EXPERIMENTAL HEPATIC FIBROSIS. (Jap.) Miyamoto, A. (Osaka City U. Med. Sch., Japan). Shiritsu Daigaku Igaku Zasshi (J. Osaka City Med. Cent.) 15(11-12 599-609, 1966.

Experimental hepatic fibrosis was induced in rats by repeated i.v. inj. of egg yolk, and the fibrinolytic system and hydroxyproline content in the liver were examined at 2, 4 and 6 wk. after the beginning of egg yolk sensitization. The plasminogen activator was extracted from the liver and examined for its activity by Astrup's fibrin plate method. The fibrinolytic activity was clearly demonstrated in the 6-wk. group. The amount of hydroxyproline fluctuated almost in parallel with the titer of the plasminogen activator. Then, the localization of the fibrinolytic activity in the liver was examined by Todd and Kwaan's fibrin slide method. The activity was found to localize in the newly-formed proliferative connective tissues, but not in parenchymal cells. Addition of ε-aminocaproic acid (4 mg/ml) to the soln. to prepare a fibrin slide completely inhibited the fibrinolyt activity.

7359 CLINICAL LIVER FUNCTION TESTS IN CANINE COMPLETE LOBAR BILIARY OBSTRUCTION. (E.) Swanson, E. A., Jr. (Emory U., Atlanta, Ga.), S. W. Gray, J. E. Skandalakis and R. B. Vincenzi. Amer. J. Gastroent. 47(4): 273-279, 1967.

Of 14 dogs, 5 were sham-operated controls; 9 underwent experimental biliary obstruction of 1 lobe of the liver. Under anesthesia the abdomen was opened; the hepatic duct from the left lateral lobe of the liver was identified, doubly ligated and divided; no ligatures were placed in controls. During the postoperative period (80-120 days) all the dogs received a weekly series of liver function tests. In each experimental dog the liver with accompanying extrabiliary structures was removed at the end

the experimental period. Location and
fectiveness of ligation were confirmed by
tex inj. of the bile duct, portal vein and
patic artery. No increase in BSP retention
s observed. Serum alkaline phosphatase rose
42 King-Armstrong U within a wk., remained
evated for 1 wk. and gradually returned to
rmal after 7 wk. SGOT rose during the second
fifth wk., and an unexplained rise in con-
ols was observed in wk. 7-8. No change in
halin flocculation was observed. The
vation in thymol turbidity was not
tistically significant. All bilirubin read-
s were within normal limits, with a small
toperative rise in both sham and experimental
s. No clinical jaundice was observed. Serum
umin was raised, serum globulin lowered but
change in the albumin/globulin ratio was not
nificant. The overall picture closely
alleled that of partial biliary obstruction in
ans. Histopathology of the affected lobes
embled human biliary cirrhosis. Because of
ferences in the structure of the biliary
e and response to function tests between
ans and dogs, it is suggested that hepatic
ction cannot be evaluated by simple applica-
n of human clinical standards to dogs.

0 LIVER CELL REGENERATION AND DEGENERA-
TION AFTER LOBAR BILIARY OBSTRUCTION
DOGS. (E.) Swanson, E. A., Jr. (Emory U.,
anta, Ga.), W. S. Millians, P. C. Sotus,
E. Skandalakis and S. W. Gray. Amer. J.
troent. 47(4):280-286, 1967.

14 dogs, 5 were sham-operated controls and 9
erwent experimental biliary obstruction of 1
e of the liver. Under anesthesia the abdomen
opened; the hepatic duct from the left
eral lobe identified, doubly ligated and
ided; no ligatures were placed in controls;
incision was closed in 3 layers. At the
of the 80-120-day observation period, dogs
e reopened under anesthesia; tissue specimens
e removed from ligated and nonligated lobes
experimental animals and from corresponding
es of controls. Location and effectiveness
ligation were confirmed by latex inj. of
e ducts, portal vein and hepatic artery.
sue specimens were fixed for 24-48 hr. in
d 10% formalin with 1% $CaCl_2$. Tissue for
tological sections was embedded in paraffin
ceresin wax; 7 μ sections were made;
ining was with hematoxylin-eosin for histo-
hology, with iron hematoxylin for mitotic
nts. Specimens for 5-nucleotidase deter-
ations were prepared by the method of
hstein and Meisel, incubated in the substrate
37° for 2-4 hr. Ligation produced periportal
rous distention of large bile ducts and
liferation of small bile ducts. Bile stain-
, pyknotic nuclei, cloudy swelling and other
enerative changes were observed in the
ated lobe by 120 days. In experimental
mals the nonligated liver showed a 5-nucleoti-
e pattern similar to the normal liver, but
weaker and less evenly distributed. Ligated lobes from the same animal showed a greatly increased intensity of reaction in the cytoplasm of surviving cells, with areas of necrotic debris remaining unstained. Regeneration activity was assessed by mitotic counts of ligated and nonligated lobes at 3-4 mo. in 7 with lobar hepatic duct ligation and 3 controls. Av. number of mitoses were: 131.7 in ligated left lateral lobes; 272.3 in nonligated lobes; 95 in controls (differences were statistically significant). While some mitoses were present in normal liver (4.3%), mitotic indices rose to 10.5% in ligated and 15.8% in nonligated lobes.

7361 STUDY ON MANAGEMENT AFTER MAJOR HEPATECTOMY. (E.) Namba, Y. (Kyoto U. Med. Sch., Japan). Nippon Geka Hokan (Arch. Jap. Chir.) 35(6):997-1009, 1966.

Following 60-70% hepatectomy, rabbits were divided into a control and 6 carbohydrate infusion groups. Infusion was initiated 2-5 hr. after surgery and repeated every 12 hr. until death or spontaneous eating supervened. Survival rate, blood chemistry, rate of regeneration, glycogen and protein and histological studies were conducted. A survival rate of over 1 mo. was highest for the 5% fructose group (52.9%) followed by 5% glucose group (26.7%) and then the control group (8.3%). All other rabbits died before 72 hr. after surgery and never ate spontaneously. Blood glucose levels normalized for both 5% glucose and fructose groups, but the latter showed faster recovery. Both these groups manifested slow recovery of serum albumin levels. Rate of regeneration was higher in the 5% fructose group compared to the 5% glucose group, but no significant difference in liver appearance was observable in both groups at 15-22 days. After hepatectomy, the liver glycogen content was higher in the 5% fructose group than in the 5% glucose group. The protein content of residual liver remained normal in both the 5% fructose and glucose groups. In hematoxylin-eosin preparations, post-hepatectomy degenerative changes were less severe and regeneration was smoother and more rapid in the 5% fructose group. Fatty liver was shown by Sudan III stain after hepatectomy. The quantity of glycogen in the residual liver remained high postoperatively in the 5% fructose group (even on the second and third days after surgery) as compared to the 5% glucose group. It is concluded that improvement of carbohydrate metabolism after major hepatectomy is best provided by 5% fructose infusion.

7362 CHRONIC IDIOPATHIC HYPERBILIRUBINEMIA WITH PIGMENT DEPOSITION IN THE LIVER. (Ger.) Knoke, M. (U. Greifswald, Germany), H. Gürtler and J. Markert. Deutsch. Med. Wschr. 92(18):832-838, 1967.

Ten patients were observed with an intermittent jaundice of a moderate grade with a peculiar type of pigment deposition in liver cells. After medical histories were taken and the clinical examinations had been made, there was no secure basis for the presence of viral hepatitis, cholecystopathy, or hemolysis. Eight were males, 2 females with an av. age of 23 yr.; 3 were free of symptoms. The others had variable jaundice of the skin and sclera, general weakness, loss of appetite, a feeling of malaise and diffuse upper abdominal pain. All patients showed a hyperbilirubinemia of about 4.80 mg%. Bilirubinuria did not occur. The urobilinogen excretion in the urine was increased. In general, the laboratory tests were in the normal range. There was a broadening of osmotic resistence by RBC. The mechanical resistance, the direct and indirect Coombs test, the differentiation of hemoglobin were all normal. A brown, coarse-grained pigment was observed under the light microscope in the centers of the lobes and in the region of the biliary capillaries. No change in the amount of pigment was seen after 1 yr. in 5 patients; there was no indication of hepatitis or liver cirrhosis. The electron microscope showed the pigment granules to be round or oval inclusions of the cytoplasm. The electron-transparent portions resembled mitochondria. The mitochondria themselves were reduced in number and their matrix thickened. These characteristics did not fit the Dubin-Johnson syndrome and its variations. The pigment granules are in some way related to the lysosomes or the residual bodies. The general picture of the disorder would fit a lysosomal enzyme defect.

7363 STUDY ON THE ABNORMALITIES IN GLUCOSE TOLERANCE IN PATIENTS WITH LIVER DISEASE.

(Jap.) Shimizu, S. (Osaka City U. Med. Sch., Japan). Osaka Shiritsu Daigaku Igaku Zasshi (J. Osaka City Med. Ctr.) 15(11-12): 541-552, 1966.

The standard glucose tolerance test was performed on 96 patients, among whom 41 were found by liver biopsy, peritoneoscopy and liver function tests to be suffering from liver cirrhosis, 33 from chronic hepatitis, 11 from fatty liver, 7 from hepatic fibrosis and 4 from other disorders. Sixty-five of 96 patients had a blood glucose level high enough to be defined as abnormal according to the World Health Organization standard, after the admin. of 100 g of glucose. Their response to the glucose tolerance test was similar to that in the case of diabetes mellitus, suggesting the important role of the liver in the regulation of carbohydrate metabolism. Concurrent studies on the clinical history of the patients revealed that the disturbance in carbohydrate utilization was more marked in cases with a longer duration of hepatic diseases, all patients with liver cirrhosis and many with chronic damage showing this marked disturbance.

7364 DEMONSTRATION OF AMYLOID IN SPLEEN AND LIVER BY FLUORESCENCE MICROSCOPY.

(Ger.) Ludwig, G. (U. Greifswald, Germany) and L. Ahrens. Acta Hepatosplen. (Stuttgart) 14(2): 100-104, 1967.

Prepared slides of spleen and liver tissue, stained in an aqueous soln. of thioflavine-S, were examined microscopically. Amyloid showed a bright yellow-green fluorescence against a matt dull green background. The application of this method to the detection of amyloid is illustrated by 2 cases: A 58-yr.-old man with hypernephric carcinoma and stomach ulcer showed secondary amyloidosis of the liver, spleen, kidney and adrenal glands. The liver demonstrated clear pericapillary amyloidosis, especially of the intermediary and peripheral lobes; acute hyperemia and lipofuscinosis of the central lobes. A 53-yr.-old woman with primary systematized amyloidosis of liver (spotty liver), without any known basis. The liver demonstrated pericapillary amyloidosis of the intermediary zones and peripheries of the lobes. Atrophy and a small amount of fine drop-like fatty infiltration of the liver epithelium. Massive amyloidosis of the periportal arteries, as well as of the adjacent periportal connective tissue. With the exception of the brain all parenchymatous organs showed amyloid deposition by fluorescence microscopy as well as by the usual staining methods. The advantages of fluorescence microscopy for this purpose are: (1) The method is simpler, easier and more rapid than the usual technics. (2) The staining is specific for amyloid, yielding an excellent visual differentiation of amyloid from other depositions, inclusions and structures.

7365 EXPERIENCE WITH ORTHOTOPIC DOG LIVER ALLOGRAFTS.

(E.) Fonkalsrud, E. W. (U. California Sch. Med., Los Angeles), O. A. Shafey, H. Ono and W. P. Longmire, Jr. Surg. Forum 17:215-217, 1966.

A technic of orthotopic homotransplantation of the dog liver without recourse to external vascular shunts is presented. In 25 dogs, resection of the liver from the vena cava and other hilar structures followed portal venous decompression. The donor liver was removed together with the vena cava, hepatic and celiac arteries and a segment of aorta. Liver temperature was lowered to 10°-14°C. The hepatic artery and portal vein were perfused (10-15 min.) with a hypothermic soln. of Ringer's lactate, low molecular wt. dextran, heparin, xylocaine, aqueous penicillin and kanamycin. The upper end of the donor vena cava was anastomosed to the recipient's abdominal aorta. The ends of the 2 portal veins were anastomosed and the portacaval shunt left intact. For biliary decompression, the donor gallbladder was anastomosed to the duodenum. The av. period of hepatic ischemia was 57 min. Oral admin. of immunosuppressive drugs was started 48 hr. after

ration. Azathioprine (2-3 mg/kg body wt.)
prednisone (5-15 mg) were also used. Of the
dogs, one is still alive. Other deaths
luded those during first 24 hr. (10 from
cular obstruction, pulmonary aspiration and
atic ischemia); 2-7 days (4 from rejection
lung infection); 1-3 wk. (drug toxicity and
itonitis); over 1 mo. (3 dogs, 2 of which died
drug toxicity, malnutrition and infection).
longest survival time was 116 days.

STUDIES OF LIVER LOBES AUTOTRANSPLANTED
OUTSIDE THE ABDOMINAL CAVITY. (E.)
el, B. (Woman's Med. Coll., Philadelphia, Pa.),
Baldia and M. R. Dunn. Surg. Gynec. Obstet.
3):525-530, 1967.

ew technic for the autotransplantation of the
lateral lobe involving anastomosis of the
of the jugular vein to the lobar hepatic vein
p equaling 29% of the liver, to the neck
on of the dog is described. Grafts were
pared in 145 9-16 kg male and female mongrel
and were considered successful if a viable
splant with patent anastomoses was obtained
he end of the period of observation. Success
in the first 50 dogs was 8%; in the last
38%; the overall rate 24%. Grafts were
ained by perfusion of their portal beds with
rial blood at reduced pressures. Bile ducts
hepatic arteries of the grafts were ligated.
phy eventually occurred, even when vascular
tomoses remained patent. With construction
n Eck fistula, graft atrophy was halted but
phy on the nontransplanted liver was observed.
e was no evidence for significant new cell
ation in the grafts. It was suggested that
t changes after fistula construction were due
constituent change in the blood (humoral
e), since the graft changes occurred in the
nce of portal flow to the transplants and
out an apparent increase in their blood flow.
humoral mechanism may be different from that
h follows partial hepatectomy.

A DONOR IN CONTINUOUS PERFUSION OF
ISOLATED LIVER. (It.) Ruffo, A. (U.
ara, Italy), P. Rossotto, G, Motta, P.
gacopulo and R. Ferraris. Minerva Med. 57(84):
-3476, 1966.

solated swine liver was submitted to
inuous perfusion with the blood supply of a
e, living dog, derived by means of a cannula
rted into the femoral artery and returned by
s of a cannula inserted into the femoral
. Technics of this symbiotic perfusion and
ods of control are described in detail.
ogenic function was conserved throughout the
ated liver and remained within normal limits.
-formation function was also conserved in the
n, and no significant anatomical or histologic
ges were demonstrable, either during the
od of perfusion or after perfusion was
terminated. Immunobiologic studies confirmed that repeated experiments with the same host animal failed to result in its developing an immune reaction.

7368 THE USE OF AN ARTIFICIAL KIDNEY DURING THE PERFUSION OF THE ISOLATED RAT LIVER. (Ger.) Baumung, H. (U. Vienna) and M. Peterlik. Med. Pharmacol. Exp. (Basel) 16(3):275-281, 1967.

Rat liver perfusions for the study of bile production, especially those requiring periods of time greater than 20 min., with relatively small vol. of perfusion fluid (about 90 ml) run into the problem of decreasing pH in the perfusion fluid, even in whole blood, because the buffering capacity of the fluid becomes exhausted. To remedy this situation an artificial kidney (dialysis apparatus) was placed in series with the perfusion apparatus which was similar to those used by others. The artificial kidney consisted of a dialyzing tube 2.8 cm wide and 160 cm long, with connections at each end for the perfusion medium, wound about a plexiglas cylinder, the layers of the tube separated and supported by a mantle of nylon mesh; this assembly was placed in vessel having an inlet tube beneath the nylon net near the outer wall of the vessel which was in turn placed in another container of 5 liter capacity; the fluid in this container was pumped from near the surface in the container through a tube and the inlet of the vessel containing the assembly; the fluid flowed over the layers of the dialysis tubing filling the vessel and overflowing its edges back into the container. The perfusion fluid (about 60 ml) was thus dialyzed into a vol. of 5,000 ml, which was a balanced, isotonic salt soln. buffered by Na_2HPO_4 and KH_2PO_4, containing glucose, and maintained at 37°C, with a rate of flow of 3 liters/min. Tests were made with 90 cm of perfusion fluid with and without the artificial kidney; the perfusion fluid was half-heparinized rat blood and half-balanced isotonic salt soln. The pH of the perfusion medium was maintained at its original value (pH 7.4+) with the artificial kidney for a test period of 2 hr. whereas the pH of the perfusion medium without the dialyzer fell from the original value linearly to pH 6.9 in the same time period. Considerable work was done to determine the amount of ions and glucose as well as the hematocrit in the perfusion fluid at 15-min. intervals for 2 hr. with the dialyzer in circuit. The stability of all parameters is emphasized.

7369 CONTINUOUS PERFUSION OF AN ISOLATED LIVER WITH DONOR BLOOD. (Ger.) Ruffo, A. (U. Ferrara, Italy), P. Rossotto, G. Motta, G. Georgacopulo and R. Ferraris. Munchen. Med. Wschr. 109(12):620-629, 1967.

Excised pig liver of an appropriate size, with cannulations of 1) the common bile duct (the cystic duct being ligated), 2) the hepatic artery, 3) the portal vein or 1 of its tributaries, and 4) the posterior vena cava up to the level of the hepatic veins, was placed in a perfusion apparatus, maintained at 37.5°C, and connected with the extracorporeal system so that the circulating medium left the liver through the vena cava, passed through a combined oxygenation chamber and reservoir, then through a variable output pump, divided into 2 streams, one passing to the liver by means of the hepatic artery and the other passing to a larger open reservoir; from which the fluid entered the portal vein. This provided the proper arterial and portal pressures. With this system the donor blood in the perfusion medium could be that of a dog (heterologous) or that of a pig (homologous). The composition of the circulating fluid was heterologous blood, 70%, Rheomacrodex, 15% and Ringer's soln., 15%. To this was added heparin, 4 mg/100 ml blood and streptomycin, 0.1 g%. An extension of this perfusion technic with reservoirs of both homogenous and heterologous fluids, a pig liver and an anesthetized dog were placed in circuit the supply to the dog being through the femoral artery and the return from the dog over the femoral vein. In this manner the compatibility of animal and organ, animal and blood and organ and blood could be tested as well as the functional integrity of the isolated liver. Bile formation of the isolated liver av. about 0.8 for each 15-min. period (0.5-1.2 ml per 15 min. period). ^{131}I-marked Rose Bengal was excreted via the bile within the normal time limits. Contrast materials were used in the perfusion fluid to obtain normal radiographs. The perfusion between the dog and the isolated pig liver was repeated 3 times with the same dog but different livers at intervals of 15-20 days. The further inj. of 20 ml of pig liver extract at intervals of 15-20 days, 3 times into the same dog which was perfused with heterologous blood 3 times caused no immunologic reaction. Microscopically, the perfused liver appeared normal. One indication of functional integrity of the isolated pig liver was the presence of intracellular glycogen using a specific staining technic.

7370 THE LIVER AND OBESITY. (Rus.) Gorki, I. (Nutrition Inst., Prague), R. Rat, Z. Slabokhova and L. Blagnikova. Vop. Pitan. 25(5):3-7, 1966.

A total of 60 obese women (17-57 yr. old) who weighed from 160.6-288.2 pounds (20-120% overwt.) were studied. No specific symptoms of liver insufficiency were evident before wt. reduction. There was a change in liver function (mainly dye excretion) in approx. 50% of the women. The extent of disturbed liver dye excretion in obese women was dependent upon the degree of excessive wt., but was independent of the percentage of fat in the body. The women were divided into 3 groups according to the type of reducing diet: 1) a reducing diet of 1200 calories (including 80 g of protein); 2) an isocaloric reducing diet with high fat content (60-80% of caloricity) an low protein content (30-60 g); and 3) a simple reducing diet with thyreoglobulin-forte (given three times per day). Dye excretion improved i all three groups, but the changes were lowest i the third group. Liver dye excretion improved i parallel with wt. reduction. The authors emphasize that methodical errors can be made in determination of BSP retention and clearance in obese patients.

7371 SERUM ACTIVITY OF ENZYMES OF MITOCHONDRIAL INTRACELLULAR ORIGIN AND OF THOSE ORIGINATING IN SOLUBLE FRACTIONS OF CYTOPLASM, IN NORMAL SUBJECTS AND IN PATIENTS WITH LIVER DISEASES. (It.) Notarbartolo, A. (U. Palermo, Italy), F. Giglio, S. Le Moli, G. Migneco, P. Citarrella and L. Pagliaro. Fegato 12(3):332-340, 1966.

The mean percentages by which 6 serum enzyme activities were increased among 70 cirrhotic patients as compared to 35 normal subjects were tabulated as follows: ornithine-carbamyl transferase = 172%, glutamic dehydrogenase = 900%, SGOT$_2$ = 107.52%, SGOT$_1$ = 101.32%, succinic dehydrogenase = 200%, SGPT = 31.63%. Comparabl tabulations for 60 patients with hepatitis (av. of repeated determinations throughout the entir course of the disorder) were: 362.66%, 2022.50 316.70%, 979.01%, 6008.00% and 608.56%, resp. For 20 other patients with hepatitis (av. of repeated determinations during the first 14 day of jaundice, only), they were: 697.33%, 3350.0 652.32%, 2891.38%, 14,600.00% and 2363.33%, res Comparable tabulations for the mean percentage increase among cirrhotic patients as compared t that among the first group of hepatitis patient (above) were 47.42%, 44.49%, 33.95%, 10.34%, 3.32% and 5.19%, resp.; as compared to that amo the second group of hepatitis patients, they were 24.66%, 26.86%, 16.48%, 3.50%, 1.36% and 1.24%, resp. It is concluded that patients with acute hepatitis show a relatively greater increase of serum enzymes originating in the cell sap; cirrhotics, a relatively greater increase of those originating in the mitochondria. It is also concluded that, in the presence of an equal degree of cell damage, the mitochondria of the cirrhotic patient's liver cells release a relatively greater amount of serum-soluble enzymes than do those of the patient with acute hepatitis.

7372 QUANTITATIVE RADIOISOTOPIC APPROACHES TO HEPATIC SIZE AND FUNCTION. (E.) Spencer, R. P. (Yale U. Sch. Med., New Haven, Conn.). Amer. J. Dig. Dis. 12(5):515-522, 1967.

Mathematical aspects of radioisotope evaluation of liver structure and function are discussed. Hepatic size and wt. can be estimated from the scan and other means, and can be compared with wt. predicted by the equation: $A = T + E$, where A is the admin. activity, T the activity

specific tissue, E background body radio-
ivity. The degree of homogeneity of uptake
be measured by computer processing. The
outer can be used to correct for use of short-
ed radioisotopes (with minimal doses, studies
be able to be extended to children and
gnant women); simultaneous use of 2 radio-
topes to examine both parenchymal-cell and
iculoendothelial function; rapid entry into,
discharge from the liver.

3 VASCULAR PATTERN OF THE BILHARZIAL
LIVER AS DEMONSTRATED BY CAST TECHNIC.
) Farag, A. M. (Fac. Med., Alexandria,
ted Arab Republic) and M. Ghanem. Alexandria
. J. 12(2-3):73-86, 1966.

the 22 livers studied by corrosion casts, 5
e normal, 12 had schistosomiasis, 4 had
nnec's cirrhosis, and 1 had post-hepatic
rhosis. The portal vein was inj. with
olored palatal P4 resin, the hepatic artery
n red-colored resin, the hepatic vein (by
erior vena cava) with blue resin. The inj.
er was left for 8 days in 5% formalin, and
er tissue was removed by maceration in conc.
for 1 wk. In schistosomal hepatic fibrosis
uction of minute fourth order branches of the
tal tree was observed. There was no change
the caliber, pattern of division, and
tribution of the trunks and first-third order
nches, nor was there amputation, lacunae, or
tortion of the portal venous system as was
erved in Laennec's cirrhosis. A newly formed
cular network around the main portal tributar-
is characteristic of hepatic schistosomiasis.
hepatic artery was normal and did not show
irregularities present in Laennec's cirrhosis.
the hepatic venous system also was normal
gests that there is no increased resistance
hepatic blood outflow in this condition.

4 THE TERMINAL DISTRIBUTION OF THE
HEPATIC ARTERY AND ITS RELATIONSHIP TO
DEVELOPMENT OF FOCAL LIVER NECROSIS FOLLOW-
INTERRUPTION OF THE PORTAL BLOOD SUPPLY.
) Nakata, K. (Osaka Med. Coll., Japan) and
Kanbe. Acta Path. Jap. 16(3):313-321, 1966.

minal distribution of the hepatic artery of
human liver was studied by arterial inj. of
ia ink and serial sectioning. The control was
ealthy 24-yr.-old male accident victim, while
erruption of portal supply to the liver lobule
observed in a 53-yr.-old male victim of
mach cancer, a 37-yr.-old female who died
n toxemia of pregnancy and a 36-yr.-old male
died from widespread hepatic necrosis caused
ccidental surgical ligation of the common
atic artery, portal vein, and common bile
outside the liver. Branches of the hepatic
ery from capillary networks around the bile
in the portal tract, from which the
illaries (terminal venous branch) arise and
connect with sinusoids at the most peripheral zone of the liver lobules. Direct anastomosis of portal vein and hepatic artery was not observed. Studies on interruption of portal blood supply showed that the portal tract, its components, and several layers of parenchymal tissue around the portal tract are nourished by the peribiliary capillary plexus. It thus is unaffected by portal obstruction, while other parts of the liver lobule undergo coagulation necrosis. It is concluded that the 2 main functions of the hepatic artery are nourishment of the portal tract, especially the bile duct, and, to a lesser extent, the most peripheral layers of the liver lobules adjacent to the portal areas.

7375 PATHOGENESIS OF SO-CALLED INTRAHEPATIC CHOLESTASIS BASED ON THREE-DIMENSIONAL ANALYSIS OF THE CHOLANGIOLAR SYSTEM. (E.)
Takahashi, T. (Tohoku U. Sch. Med., Sendai, Japan) and T. Hayama. Tohoku J. Exp. Med. 91(2): 149-176, 1967.

Livers studied in 3-dimensional reconstruction of the cholangiolar system included 3 with intrahepatic cholestasis, 2 with subacute serum hepatitis, and 1 normal. Specimens were fixed in formalin, embedded in celloidin-paraffin, and 200-300 6 μ serial sections were made. In intrahepatic cholestasis, reconstruction analysis showed a disturbance in continuity of biliary pathways, not observed by routine histological examination. Regeneration of bile ductules is thought to follow formation of random indiscriminate cholangiolar lesions, but is not able to restore sufficient passage of bile flow. Both cases of serum hepatitis showed a similar cholangiolar derangement, suggesting that cholestasis accompanied viral hepatitis and this was exaggerated in intrahepatic cholestasis. When cholangiolar derangement persisted beyond recovery of liver cell injury, intrahepatic cholestasis (characterized by obstructive jaundice and absence of other serious liver function damage), was regarded as a sequela of hepatitis, most frequently of viral origin. It is concluded that intrahepatic cholestasis is not a separate pathological entity, but is best described as "cholangiolar derangement syndrome."

7376 THE RELATIONSHIP OF HYPERCAPNIA TO THE PRODUCTION OF KERNICTERUS. (E.)
Lending, M. (New York Med. Coll., N. Y.), L. B. Slobody and J. Mestern. Develop. Med. Child. Neurol. 9(2):145-151, 1967.

A bilirubin infusion (40 mg/kg in 20-30 ml saline) was given to 29 normal mongrel puppies under 3 mo. of age anesthetized with pentobarbital sodium to decrease pain reflexes but not respirations. Controls (8, Group 2) received bilirubin infusion only. Experimental puppies (21, Group 1) received bilirubin (to induce hyperbilirubinemia) and intermittent periods of hypercapnia, induced by endotracheal admin. of an approx. 93:7 mixture (varied) of O_2:CO_2 for 30-45 min., to cause respiratory acidosis (as measured by arterial blood pH, CO_2 levels, and clinical appearance). The following were measured: cisternal fluid level; serum bilirubin level; cerebrospinal fluid/serum bilirubin conc. ratio; gross study of brain stem and nuclear masses. In Group 1 hyperbilirubinemia, hypercapnia, and serum bilirubin levels of at least 20 mg/100 ml were maintained for 48 hr. Respiratory acidosis (pH 6.69 in 1; 7.22 in 2), but not hypoxia, was observed. Of these 21, 13 (62%) showed definite gross focal areas of bilirubin staining of nuclear masses. Controls showed only mild diffuse staining of brain, and no gross focal staining of nuclear masses. Both groups developed essentially the same degree of hyperbilirubinemia. The av. content of cerebrospinal fluid bilirubin was twice as great in dogs with kernicterus as those without (0.137 in 1, 0.091 in 2). The cerebrospinal fluid/serum ratio was also about 2.5 times greater in those with changes of nuclear staining. It is suggested that hypercapnia accompanied by respiratory acidosis alters the permeability of the blood-cerebrospinal fluid barrier in young puppies. When associated with hyperbilirubinemia it is an important factor in the production of kernicterus.

7377 BACTERAEMIA IN ASSOCIATION WITH HEPATOCELLULAR AND HEPATOBILIARY DISEASE. (E.) Jones, E. A. (Roy. Free Hosp., London), N. Crowley and S. Sherlock. Postgrad. Med. J. 43(Suppl.):7-11, 1967.

A study was made of 40 patients with bacteremia (46 cases) associated with hepatobiliary disease, 27 with cirrhosis. Patients were divided into 2 groups: hepatocellular disease (29) included cirrhosis (25), chronic active hepatitis (4), hepatobiliary disease (11) included obstructive disease of biliary tract (9), hepatic cyst (1), and intrahepatic abscess (1). The mortality rate was 59% in the first group and 27% in the second, and was twice as high in males as in females. In 34%, bacteremia occurred in the last 7 days of life. Gram-positive organisms predominated in the first group, gram-negative in the second. The major means of entry of organisms was the respiratory and gastrointestinal tract in the first group, and the biliary tract in the second. In 6 patients, bacteremia followed some sort of surgical procedure. In cirrhotics with bacteremia, 18% never had temperatures higher than 37.2°C, 85% lacked rigors, 52% never had blood pressure below 100 mm Hg, and 64% never had a peripheral WBC above 10,000/mm^3. In hepatocellular patients, bacteremia caused or worsened hepatic precoma or coma. In the first group bacteremia was associated with the presence of severe liver cell failure, in the second group with cholangitis or surgery to relieve obstruction. Many of the patients studied were on antibiotics.

7378 PRESENCE OF BILE ACIDS IN JAUNDICED HUMAN URINE. (E.) Gregg, J. A. (Mayo Clin., Rochester, Minn.). Nature (London) 214(5083):29-31, 1967.

An attempt to establish the presence of cholic and chenodeoxycholic acid in the urine of a 45-yr.-old female patient, with biliary cirrhos secondary to postoperative obstructive jaundice by thin-layer and gas-liquid chromatography is described. About 10 mg of each acid was estimated by spectrophotometric analysis in a 24-hr. urine sample. It is suggested that thes values constitute only a semiquantitative determination.

7379 CLAMPING OF THE HEPATIC PEDICLE UNDER REGIONAL HYPOTHERMIA (EXPERIMENTAL STUDY). (Fr.) Pouyet, M., C. Bacques, P. Béra and G. Bousquet. Lyon Chir. 63(1):119-124, 196

Side-to-side portacaval anastomosis under local hypothermia (10-15 min.) of the liver and 30-60 min. of clamping of the hepatic pedicle was performed in 33 dogs, 25 of which were evaluable. The survival rates after 30, 45 and 60 min. of hepatic pedicle clamping (5,10 and 10 animals resp.) were 100%, 90% and 60%, resp. Tolerance of the circulatory system to hepatic clamping was good, but release of the clamp always produced circulatory collapse of various degrees, usually reversible. No histological changes were noted in postoperative biopsies, but SGOT and SGPT levels (in 17 dogs) rose significantly (av. 529 and 475 U, resp.) to peak levels 1 hr. after release of the clamp, and remained elevated for the next 15 days. Coagulation tim and prothrombin titers (studied in 13 animals) remained normal; fibrinolysis factors were not observed, because the animals were routinely treated with ε-aminocaproic acid. Hyperglycemi was noted for 1 hr. after release of the clamp. It is concluded that 45 min. is the max permissible duration of hepatic occlusion in th dog, and that it should be performed clinically only when essential, because of its functional effects on the liver.

7380 A METHOD FOR VITAL MICROSCOPY OF THE HEPATIC MICROCIRCULATION IN LARGE ANIMALS AND MAN. (E.) Woodward, N. W., Jr. (Cook County Hosp., Chicago, Ill.), R. M. Vanecko and W. C. Shoemaker. J. Surg. Res. 7(4):173-176, 1967.

Continuous transillumination and photographic documentation of hepatic microcirculation in th Rhesus monkey using a modified Leitz Ultropak incident light illuminator is reported. Reflected light from a standard external source permitted continuous observation while a quartz electronic light (high intensity for 0.001 sec. placed in the light path enabled photographic documentation at magnifications of 22-176 power Photomicroscopy was accomplished by use of a

mm camera with both a split-beam adapter and
h speed film. Best color contrast of liver
sue was obtained by employment of a light
en transmission filter. Use of this technic
l obviate introduction of artifacts
ociated with manipulation and preparation of
specimen. This method has been used with
cess for over 2 yr. in studying hepatic
culation in shock and is applicable for study
other large parenchymal organs in large
mals and perhaps liver microcirculation in
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FUNCTIONAL CONDITION OF THE LIVER IN PATIENTS WITH UTERINE BODY CANCER.

s.) Danova, L. A. (Inst. Oncology, Ministry
lic Health, Leningrad, USSR). Vop. Onkol.
9):43-48, 1966.

isturbance of the carbohydrate, pigment,
tein and detoxification functions of the
er was found in 80 patients with cancer of
body of the uterus. There was a decrease in
tolerance to glucose after loading in 30 of
patients tested; 22 had an increased hyper-
cemic coefficient (up to 2.5 or more) and in
the time of max. increase of blood sugar was
longed (from less than 60 to 150 min.). The
al bilirubin content was elevated in 10 of
and direct bilirubin was increased (more than
7 mg%) in 23 of 32 patients tested; there-
e, 32 of 54 had pathological changes of the
ices of pigment metabolism. Albumins were
eased in 21 of 52, and the globulin fraction
increased in 16 of 52 patients studied. The
umin-globulin coefficient was less than 1.3
24 of 52 patients. The Hg_2Cl_2 test was
ormal in 13. The excretion of hippuric acid
abnormal in 13. A disturbed detoxification
elimination of sodium benzoate was found in
of 39. Glutamine-asparagine transaminase
vity was somewhat above normal (from 40-85 U)
51% of the patients examined, and aldolase
normal in 15 patients. Based upon these
ical and laboratory data, the disturbance of
er function in patients with cancer of the
rine body corresponds to that found in
onic hepatitis.

DETECTION OF HEPATIC SHUNTS BY THE USE OF ^{131}I-MACROAGGREGATED ALBUMIN. (E.)

, H. (U. Tokyo), K. Kitani, H. Kameda, H.
ada and M. Iio. Gastroenterology 52(3):
-487, 1967.

jects were 23 patients (18 men, 5 women;
58 yr.) with hemolytic anemia (3), acute or
onic hepatitis (4), liver fibrosis and
enomegaly (1), hepatic cirrhosis (15).
gnosis was by functional tests, laparoscopy,
er biopsy, laparotomy examination, autopsy.
er scintigrams (25) were obtained immediately
er inj. of ^{131}I-macroaggregated albumin
μc/ml) into the spleen. A portal system
nt was diagnosed when the lung contour in
scintigrams was delineated, and the "shunt index" was calculated: = 100 X (total lung counts)/ (total liver counts) + (total lung counts). Prior to scanning, liver and lung accumulation curves were recorded in 13 patients by the above technic. One scintillation detector was placed over the right lobe of the liver, the second over the left upper lung field (slightly slanted toward the head to avoid scattered radioactivity from liver and spleen). From these, portal circulation time (spleen to liver; spleen to lung) was measured and intrahepatic shunts were searched for (presence indicated by initial hump in liver curve). Three with hemolytic anemia, 4 with hepatitis, and 2 with cirrhosis had no shunts. Collateral circulation in the splenoportal system was detected in 13 of 15 cirrhotics and 1 with liver fibrosis. Shunt indices were 18-90 in cirrhotics with shunts, and below 6 in patients without shunts. An initial hump in accumulation curves was observed in 7 cirrhotics, suggesting the presence of intrahepatic shunts. Spleen-to-liver circulation time was almost the same (approx. 2 min.) whether or not cirrhosis was present. Spleen-to-lung time through collateral veins ranged widely (5-12 min. with shunt only). Use of this radiocompound is an easy method for detection and semiquantitation of intra- and extrahepatic shunts in hepatic cirrhosis.

7383 MORPHOLOGICAL AND BIOCHEMICAL STUDIES OF BENIGN RECURRENT CHOLESTASIS. (E.)

Biempica, L. (Albert Einstein Coll. Med., Bronx, N. Y.), S. Gutstein and I. M. Arias. Gastroenterology 52(3):521-535, 1967.

A 27-yr.-old man had experienced 14 episodes of jaundice, pruritis, bilirubinemia and wt. loss since puberty. Onset was not associated with diet, alcohol, infection, sedatives or excessive physical activity, and remission was spontaneous in each episode. Icteric liver was diagnosed at 15 yr., with a normal extrahepatic biliary system. Diabetes mellitus was diagnosed at 25 and was well-controlled with tolbutamide. During episodes, bilirubin, alkaline phosphatase, and serum di- and trihydroxy bile acid conc. were increased, and tubular max. BSP and hepatic BSP storage were reduced. Simultaneous biopsy showed markedly altered canaliculi, with distorted and reduced microvilli; almost complete disappearance of nucleoside phosphatase activity; reduction in the number of acid phosphate-rich lysosomes. Intracellular bile pigment was common. Glycogen nuclei and lipid spheres were abundant and canalicular. In a second biopsy 10 mo. later during clinical remission, functional, cytochemical and ultrastructural studies showed a return to normal patterns with the exceptions of the presence of small amounts of intracellular and intracanalicular bile pigment; some glycogen-rich nuclei; presence of crystalline nucleoids within the microbodies.

7384 DECOMPRESSION OF PORTAL CIRCULATION BY GRAFTS OF PEDUNCULATED LUNG INTRODUCED INTO THE PARENCHYMA OF THE SPLEEN. (It.)

Rapisarda, L. M. (U. Palermo, Italy) and G. Barbera. Minerva Chir. 22(3):109-114, 1967.

In one group of dogs, progressive stenosis of the portal vein was induced by inserting cellophane at the level of the transverse fissure of the liver, creating a progressive portal hypertension which stabilized at 85 cm H_2O. In a second group, 2 decorticated, pleura-free strips of pulmonary parenchyma, each approx. 10 cm long and 6 mm thick, were grafted into a sort of tunnel of splenic parenchymal tissue after the spleen had been drawn up and fixed on the diaphragm. This was done at the same time the source of portal stenosis was created. In this second group of animals, portal hypertension developed at approx. the same rate, but stabilized at only 50 cm H_2O. Autopsy confirmed the creation of innumerable vascular and fibrous connections between the spleen and the pulmonary hilus and between the spleen, the diaphragm and the lung, consisting of neoformations and creating a considerable network which connected the portal and systemic circulations. Inj. of contrast material further confirmed the movement of liquid from the spleen, through the network in question, into the systemic circulation.

7385 RECURRENT JAUNDICE IN PREGNANCY. I. A CLINICAL AND ULTRASTRUCTURAL STUDY.

(E.) Adlercreutz, H. (U. Helsinki Meilahti Hosp.), A. Svanborg and Å. Ånberg. Amer. J. Med. 42(3):335-340, 1967.

A study of clinical symptoms, functional liver tests, and ultrastructural alterations in the liver was made in 10 patients (19-34 yr.): 7 pregnant for the first time; 1 pregnant and jaundiced for the second time; 2 pregnant and jaundiced for the third time. Clinical tests included: serum bilirubin, serum alkaline phosphatase, thymol turbidity, plasma proconvertin-prothrombin, SGOT, SGPT. Liver biopsies were performed at least once in each and were examined by light and electron microscopy. In 1 patient (36 yr. old) with pronounced and prolonged jaundice, surgical laparotomy revealed signs of intrahepatic cholecystatic jaundice. The amount of bile secreted (250-575 ml daily), secretion pressure, and bile viscosity (1.07-1.27) were normal. Jaundice disappeared within 2-3 wk. of spontaneous delivery, but a slight increase in SGOT, SGPT and serum alkaline phosphatase was observed for an additional 2 mo. Liver biopsy after 3 mo. was normal. Ultrastructural abnormalities were observed in all specimens during the period of jaundice, and these disappeared after delivery. Abnormalities included: dilatation of most bile canaliculi; regional disappearance of microvilli; some enlarged, elongated irregular mitochondria in the parenchymal liver cells. In sections of these giant mitochondria, inner membranes were replaced by systems of alternate dark and light parallel lamellae. These ultrastructural alterations of recurrent jaundice of pregnancy are thought to be nonspecific, since they have been observed in extrahepatic bile stasis and in infectious or toxic liver disease.

7386 IMMUNOFLUORESCENCE STUDY OF RHEUMATOID FACTOR IN LIVER TISSUE OF PATIENTS WITH RHEUMATOID ARTHRITIS AND HEPATIC DISEASES. (E.)

Bonomo, L. (U. Bari Med. Sch., Italy), A. Tursi and V. Minerva. J. Path. Bact. 92(2):423-431, 1966.

Fluorescent aggregated human γ-globulin was used to demonstrate rheumatoid factor in liver biopsy sections from 20 patients, all seropositive for rheumatoid factor, who had rheumatoid arthritis, systemic sclerosis, hepatic diseases (mainly active viral hepatitis and postnecrotic cirrhosis) and other diseases. The macroglobuli character of the globulin reactive with fluorescent aggregated γ-globulin was confirmed by staining with fluorescent anti-19S γ-globulin antiserum and treatment of liver sections with 2-mercaptoethanol. Both rheumatoid factor-seropositive and -seronegative patients had γ-globulin-containing cells, but these were much more numerous in the seropositive biopsies. Cellular rheumatoid factor could not be demonstrated in 29 liver specimens taken from control patients, all seronegative, with various disease conditions. The rheumatoid factor-containing cells had the appearance of reticulo-endothelial Kupffer or plasma cells. The number of rheumatoid factor-containing cells in the liver disease group was often equal to or greater than that in rheumatoid arthritis, despite the higher serum rheumatoid factor levels in the rheumatoid arthritis group.

7387 ADENOSINE DEAMINASE ACTIVITY IN LIVER DISEASES. (E.)

Secchi, G. C. (U. Milan, Italy), A. Rezzonico and N. Gervasini. Enzym. Biol. Clin. (Basel) 8(1):67-72, 1967.

Levels of adenosine deaminase activity were measured in normals (13) and subjects with early liver cirrhosis (7), advanced cirrhosis (27), hepatic coma (6) and viral hepatitis (16). Diagnosis was confirmed by needle biopsy and liver function tests. Patients with early hepatic cirrhosis (23 I.U.) and those with viral hepatitis showed a marked, significant increase in serum adenosine deaminase activity. Levels were slightly elevated with advanced cirrhosis (11 I.U.), but not at all with hepatic coma (4 I.U.). Normals ranged from 3-6 I.U. The progressive decrease in enzyme activity with advanced cirrhosis and hepatic coma was statistically significant in comparison with early cirrhosis. Increased levels may be related to cell necrosis or damage during the e of cirrhosis. Decreased levels may be o the failure of protein synthesis in the , which becomes more evident in terminal osis and coma, when the cell's synthetic atus is injured, causing a fall in cell and a enzyme conc. There was no correlation en changes in this enzyme and those in serum proteins synthesized in the liver as prothrombin, cholinesterase, α_2-globulins lbumin, but there was a significant lation between decrease in enzyme activity ncrease in blood ammonia. It is concluded in advanced cirrhosis and hepatic coma, evels may be caused by a reduction in ic synthesis of the enzyme, incomplete esis of enzyme, metabolic readjustment or olite repression.

CAPNOSPLENOPORTOGRAPHY. ASSESSMENT OF PORTAL VEIN PATENCY IN DOGS WITH CAR-IOXIDE GAS. (E.) Hipona, F. A. (Harvard Sch., Boston, Mass.) and W. M. Park. Amer. entgen. 99(3):606-611, 1967.

splenoportography, the use of CO_2 gas as a negative contrast material in splenography under experimental conditions, was to study the portal venous system in dogs e normal, after partial and complete sion of the portal vein and in simulated l hypertension. Comparative serial genograms were done using 60% methylglucamine izoate (1 ml/kg) and CO_2 gas (2-3 ml/kg, ml/kg). Partial or complete occlusions e portal vein either directly or by teral vessels was shown with capnooportography, whereas similar results were onsistently reproduced with conventional ive contrast agents when blood flow was ly hepatofugal. Patency of the portal vein nown very well with capnosplenoportography tificially-induced portal venous hyperon; with 60% methylglucamine diatrizoate, was poor visualization of the portal vein se of dilution of the contrast material, ming (a mixing defect) had prolonged transit in the portal vein. A left posterior ue projection is considered to be the ideal ion for this technic; in the normal, ion of examination is 10 sec., with optimal stration of the portal vein occurring 2-4 after the start of inj. This does not e appreciably, even under conditions of ed experimental pathology. A dose of 2-3 of CO_2 gas is considered adequate for good lization of the splenoportal venous system. echnic is clinically applicable in patients re hypersensitive to iodinated contrast and in cases where there is nonvisualizaof the portal vein by conventional splenoraphy.

STUDIES ON AZIDE, CAERULOPLASMIN AND COPPER IN RELATION TO WILSON'S DISEASE Williams, A. O. (U. Ibadan, Nigeria). J. Exp. Path. 48(2):180-187, 1967.

Male Wistar rats were divided into 5 groups: Group 1, 6 normal rats given 0.02% sodium azide soln. as a substitute for drinking H_2O for 120 days; Group 2, 6 normal rats given 0.2% copper acetate soln. as a substitute for drinking H_2O for 320 days; Group 3, 6 rats given 0.2% copper acetate soln. for 200 days and then 0.02% sodium azide soln. for 120 days instead of drinking H_2O; Group 4, 6 rats given 0.2% copper acetate soln. for 200 days and then a mixture of 0.02% sodium azide in 0.2% copper acetate soln. instead of drinking H_2O for 120 days; and Group 5, 12 control rats given ordinary drinking water. The minimum lethal conc. 50 (MLC_{50}) for sodium azide was 0.05% and for copper acetate, 0.5%. Serum copper oxidase was assessed as an indication of ceruloplasmin, and SGPT as a test of liver function. There was no mortality in any of the groups of rats and no significant differences in av. wt. of the animals. In all the livers of rats given sodium azide for 120 days, the only significant histological change was focal liver cell necrosis with mononuclear cellular reaction; portal tracts showed no significant lesion and the reticulin framework was intact, except in areas of focal necrosis. Similar histological changes were noted in livers of rats given copper acetate for 320 days, and also in rats with a combination of copper acetate and sodium azide intake. Rats in Groups 3 and 4 had the highest av. Cu content in the liver (40.75 and 46.76 µg/g of wet tissue, resp.); in the presence of increased tissue Cu in these rats, there was a significant reduction in the level of serum ceruloplasmin attributable to ingestion of the sodium azide soln. Capacity of the liver to synthesize or produce albumin was impaired in Group 1 and 2 rats, as reflected on electrophoretic analyses of serum proteins; the diminution in the albumin fraction was consistent with hepato-cellular damage due to either Cu or azide. There was only a slight reduction of the albumin fraction in the sera of Group 3 and 4 rats. Estimations of SGPT in the various groups showed a variable but gradual increase of enzyme conc. in all rats, but the overall increase of SGPT was not as high in Group 3 and 4 rats with a combination of Cu and azide when compared with the other groups of rats. It is concluded that sodium azide is hepatotoxic and produces histopathological changes similar to chronic Cu poisoning, and that it produces a transient fall in the serum ceruloplasmin level in Cu-poisoned, but not in normal, rats. It is unlikely that diminished ceruloplasmin alone plays any significant role in the pathogenesis of hepatic lesions. The cerebral pathology produced by these various sodium azide and Cu parameters is also analyzed and discussed.

7390 HEMOLYTIC ANEMIA IN WILSON'S DISEASE. (E.) McIntyre, N. (Roy. Free Hosp., London), H. M. Clink, A. J. Levi, J. N. Cumings and S. Sherlock. New Eng. J. Med. 276(8): 439-444, 1967.

Three patients (9 and 12-yr.-old boys, and a 21-yr.-old woman) with hepatolenticular degeneration and associated acute hemolytic episodes are described. During attacks of hemolysis large amounts of Cu were excreted in the urine. Clinical and laboratory evidence of liver disease were present, and cirrhosis was proven histologically. Kayser-Fleischer rings were noted, and 1 case also presented mild neurologic features. In 2 cases serum ceruloplasmin was low; in all 3 urinary Cu output (1300-6590 μg) was well above normal. Postmortem analysis of 2 cases revealed a high Cu content of the liver (162 mg/100 g dry tissue in 1 case), which was strongly suggestive of hepatolenticular degeneration. Moderate or severe anemia of sudden onset was associated with reticulocytosis and with the appearance or exacerbation of jaundice; the 2 younger patients had normoblastic hyperplasia of the bone marrow. The ^{51}Cr half-life of RBC was markedly reduced. In 2 cases there was no significant loss of blood into the intestine; in the third, fecal loss was inadequate to account for the short RBC half-life. The 12-yr.-old boy had repeated episodes of hemolysis, with transient but definite periods of improvement for 8 mo. before death from hemorrhage due to esophageal varices. The 9-yr.-old boy died 1 mo. after the first attack of hemolysis. In the 21-yr.-old woman, a hemolytic reaction developed 12 yr. after appearance of signs of hepatolenticular degeneration. In the 2 young boys, the hemolytic episode was initially confused with hepatocellular failure, and in all 3 ascites developed at this time, adding to difficulties in diagnosis. The mechanism of production of hemolysis is discussed. The sudden release of Cu from tissues into blood, with resultant hemolysis of RBC, is a mechanism analogous to that of enzootic jaundice in sheep and is regarded as the most likely explanation of the acute hemolytic episodes.

7391 A NEW METHOD FOR TOTAL, FREE, AND CONJUGATED SERUM BILIRUBIN. (E.)

Ferro, P. V. (Dade Reagents, Inc., Miami, Fla.) and A. B. Ham. Amer. J. Clin. Path. 47(4): 472-480, 1967.

A new method for quantitative determination of total, free and conjugated serum bilirubin is described. The proposed method estimates total and free bilirubin, and the conjugated fraction is expressed as the difference of these 2 values. An alternate approach determines free and conjugated bilirubin, and total bilirubin is expressed as the sum of these 2 fractions. For total bilirubin, the proposed method requires that serum be added to a mixture of chloroform and a stable oxidizing agent. The mixture is incubated for 10 min. at 37°C or 5 min. at 56°C, and the stable blue color is read at 640-660 mμ. For free and conjugated bilirubin, serum is added to the acidified solvent and chloroform is added; the mixture is shaken for 20-30 sec. and centrifuged. Aliquots of the chloroform layer containing the free bilirubin and the upper layer containing the conjugated bilirubin are removed and subjected to the same oxidation technic as that used for total bilirubin. Determinations using this method were made on sera from 68 supposedly normal donors. The range for total bilirubin was found to be 0.2-0.9 mg/100 ml, with an av. of 0.5 mg; for free bilirubin, the range was 0.2-0.8 mg/100 ml with an av. of 0.4 mg, and the conjugated bilirubin range was 0-0.2 mg/100 ml, with an av. of 0.07 mg. The new method had excellent reproducability. A comparison of the Malloy-Evelyn method (Klatskin and Drill 1-min. direct procedure) with the author's method on 20 norma sera showed no significant difference in the values obtained for total bilirubin and the 2 bilirubin fractions. With abnormal sera the 2 methods varied greatly in values for the 2 bilirubin fractions. In the author's method, values for free bilirubin were one-third those of the indirect values obtained with the Malloy-Evelyn method. The author's method also showed an increase of approx. 50% in the amount of conjugated bilirubin, compared with the direct determination by the Malloy-Evelyn procedure. Sera with total bilirubins as high as 65 mg/100 ml were tested. With the test ser used, no serum of nonhemolytic origin showed a free bilirubin value in excess of 8 mg/100 ml. The highest indirect bilirubin value by the Malloy-Evelyn method was 25.5 mg.

7392 AN ASSOCIATION OF HEMOCHROMATOSIS AND HYPERLIPEMIA. DEMONSTRATION OF THE GENETIC TRANSMISSION OF THESE TWO CONDITIONS.

(Fr.) Luton, J. P. (Med. Soc. Hosp., Paris), J. L. De Gennes and P. Rambert. Bull. Soc. Med Hop. Paris 117(12):1197-1210, 1966.

A unique case involving a 36-yr.-old male prese the possibility of the coexistence of familial hemochromatosis and familial hyperlipemia. Extensive studies were conducted to demonstrate that the hyperlipemia was not a secondary symptom of the hemochromatosis. For example, the hyperlipemia remained at high levels after the acid ketosis was totally corrected and the hyperglycemia of the diabetes was partially corrected; no pancreatic dysfunction was detected which could explain the lipid anomalie and hepatic function appeared normal which eliminated the possibility of a default in the purification of the chylomicra originating from the alimentary tract. It is concluded that thi was a case of endogenous hyperlipemia of geneti origin. The condition is evident in several family members; both a grandparent and uncle were diabetic. In this case, the diabetes was insulin-dependent, requiring 108 U of insulin per day. The hemochromatosis present also seemed to be a primary rather than secondary condition as it occurred at the age of 20 yr.

to any history of diabetes, fatty liver or
anomalies. It also seems genetically
mitted as the patient's mother had the same
culty.

THE MECHANISM OF ACTION OF CORTICO-
STEROIDS ON THE BILIARY SYNDROME IN
IC HEPATITIS AND CIRRHOSIS. (Fr.) Fodor,
rd Med. Clin., Cluj, Rumania), F. Barbarino,
coara and I. Fratila. Rev. Int. Hepat.
:1327-1343, 1966.

ications in the biliary syndrome noted in
tients with postviral chronic hepatitis were
ced by the admin. of 4 mg/day for 5 days of
-fluoro-delta-hydrocortisone. The follow-
hanges in the economization of bilirubin
recorded: a decrease in the bilirubinemia
an av. of 1.28 mg% to an av. of 0.69 mg%;
onc. of bile pigments in the hepatic bile
ased from an av. of 5.75 mg% to 7.84 mg%;
he rate of conjugated bilirubin/nonconjugated
ubin increased in the bile. Measurements
with BSP following the admin. of the
costeroid showed a decrease in the serous
tion of BSP, an improvement in the urinary
nation of BSP, a reduction in the time
en the admin. and the appearance of BSP in
le, and an increase in the biliary conc.
as well as the conjugated fraction. In
on, transaminase studies showed a decrease
level of serum transaminase (attributed
orrection in membrane permeability). The
f albuminemia increased while the gamma
ins remained the same. Values of the
reaction were reduced. From these data
concluded that the cortisone induced the
ion of hepatocellular enzymes which play a
n conjugation and protein-synthesizing
on.

SOME CLINICAL AND EXPERIMENTAL
OBSERVATIONS ON SERUM PEPTIDASE
TY IN HEPATIC DISORDERS. (E.) Horký, J.
Human Nutr., Prague), Z. Placer and O.
. Clin. Chim. Acta 16(2):279-285, 1967.

peptidase activity, as measured by the
metric method, in humans and rats
imental models) with different liver
es, is compared with the anatomical
ion and liver function tests. Clinical
ts (60) suffered from acute hepatitis (5),
c hepatitis (8), cirrhosis (24), cholestatic
ce (7), other liver diseases (9) and post-
c syndromes without a detectable liver
(7). Highest activity was found in
tatic jaundice and acute conditions. On
sis of anatomical comparison, highest
were obtained in cholestasis and necrosis
er cells. Compared with functional tests,
ty correlated most closely with bili-
mia and alkaline phosphatase, and quite
y with cholesterol and serum albumins. In
stic disease, patients with hepatic and
extrahepatic metastases had the highest levels. In experimental necrosis, liver peptidase activity fell and serum rose. In experimental cholestasis, serum peptidase activity, and later liver, rose. During the first days of liver regeneration, both levels rose but soon returned to normal. In experimental cirrhosis, liver activity remained the same, while serum rose. It is concluded that a high serum peptidase is not specific for hepatic disease.

7395 THE RELATIONSHIP BETWEEN HEPATIC GLUTATHIONE CONJUGATION AND BSP EXCRETION AND THE EFFECT OF THERAPEUTIC AGENTS. (E.) Boyland, E. (Roy. Cancer Hosp., London) and P. L. Grover. Clin. Chim. Acta 16(2): 205-213, 1967.

Rat and human liver biopsy specimens obtained at laparotomy were used. There are 3 stages in plasma clearance of circulating BSP: hepatic uptake and intrahepatic conjugation of dye followed by biliary secretion of free and conjugated dye. Overall rate of dye clearance is limited by the slowest step. In 5 patients with hepatic cirrhosis there was a marked decrease in activity of glutathione S-aryltransferase (enzyme responsible for hepatic conjugation of BSP with glutathione) compared with 3 normal livers, but only 3 of 5 showed a corresponding increase in dye retention. These results suggest that a slight increase in dye retention may be accompanied by a much more marked fall in enzyme activity. Low enzyme activity coupled with normal dye retention provides strong evidence that the activity of conjugating enzyme is not rate-limiting in normal liver. In *in vitro* studies, compounds causing jaundice and dye retention were examined as potential inhibitors of conjugating enzyme. Inhibition was by benziodarone (100%), flavaspidic acid (94%), iodopanoic acid (80.5%), bunamiodyl (64.5%), biligrafin (50.5%), novobiocin (47.1%), and others. It is suggested that enzyme inhibition by radio-opaque cholecystographic agents and male fern extract (flavaspidic acid) may be due to the presence of iodine atoms which are not activated by electron-withdrawing groups in the molecule and are therefore not replaced by glutathione at the active center. Benziodarone, a coronary dilator, was studied in rabbits and was found to reduce dye conjugation without affecting hepatic uptake or excretion.

7396 CHANGES IN ACTIVITY OF SERUM CHOLINESTERASE IN DIFFERENT LIVER DISEASES, ESPECIALLY IN INFECTIOUS HEPATITIS OF THE ADULT. (Ger.) Otto, H. (Region. Hosp., Kothen, Germany). Deutsch. Gesundh. 22(18): 841-846, 1967.

The author reviews the methods by which serum cholinesterase can be determined. For his own work he used the "Acholtest paper" of the Linz Sulfur Co. and the Biophan C-paper. Normal values were from 4 min. (high activity) to 18 min. (low activity) with an av. of 12.7 min. marked by a change to green. Translated into U, 20 U would correspond to 4 min. and 5.6 U to 18 min. In another list 20 normal people had activities expressed in min. from 4-10; 86 new cases of hepatitis, 4-16 min.; severe cases, 25 min.; 74 cases hepatitis of 2 and 3 wk., 4-10 min.; severe cases, 25 min.; 60 cases of hepatitis, 4-6 wk., 5-28 min.; 46 cases of hepatitis after 6 wk., 28 min.; 5 jaundice of pregnancy, 14-25 min.; 1 cholangitis and diabetes, 5 min.; 1 hepatitis with mononucleosis, 10 min.; familial jaundice, 11 min.; 30 healthy men, 4-9 min. Although serum cholinesterase decreases as damage to liver parenchyma increases, the author's data show that 60% of the cases lie within the 10-min. value and almost all are within the 18-min. limit of his definition. The values of cholinesterase, as determined by the test paper method at least, overlap too freely between the normal individuals and those with liver disease for this test to be considered as a liver function test or even as an indication of a trend toward increased hepatic damage.

7397 OUR EXPERIENCES WITH THE OIB-TEST (A TEST OF LIVER FUNCTION FOLLOWING THE METABOLISM OF ^{131}I-ORTHOIODOBENZOIC ACID. (Ger.)

Dohnálek, J. (Purkyne U., Brno, Czechoslovakia), M. Eysselt, K. Martínek and D. Kadlecová. Nuclearmedizin 6(1):76-86, 1967.

Normal controls (66) and 304 patients with hepatic or malignant diseases (45 with chronic hepatitis, 29 with liver cirrhosis, 55 with chronic cholecystitis, 25 having duodenal ulcer, 54 with mammary carcinoma, 52 with pulmonary carcinoma, 20 having laryngeal carcinoma and 24 suffering from malignant lymphogranuloma) were given 1 oral dose of 2 mg ^{131}I-labeled orthoiodobenzoic acid with 20 μc radioactive I_2; 4 metabolites of this compound were measured by scintillation counts after separation by electrophoresis from urine samples collected for uniform periods after the admin. of the oral dose. The metabolites were (1) o-iodobenzoyl-glucuronide, making up the largest amount, about 70% normally, (2) o-iodohippurate, normally about 6% of the total products, (3) o-iodobenzoate, normally about 22% and (4) the fourth fraction, in healthy subjects about 4-5%. The excretion rate, expressed as the time required for the excretion of half the oral dose or its products, was 7-9 hr. in healthy young subjects and 9-11 hr. in healthy older subjects. The excretion of each type of metabolite was established for the control group and for each group with a different pathology. Most useful was the percentage of each type of metabolite at the time of half-excretion, and of these the percentage of the first fraction was most revealing. Thus, in the control group this value was 67%; for patients with liver cirrhosis, 76.4%; chronic hepatitis, 74.2%; cholecystitis, 75.1%, duodenal ulcer, 67.1%; mammary carcinoma, 79.1%; lung carcino 83.1%; lymphogranuloma, 78.5%; and laryngeal carcinoma, 73.9%. Excretion of o-iodobenzoyl glucuronide was significantly elevated above the normal value in every pathological condit tested except duodenal ulcer; the values of t 3 other metabolic fractions excreted were als normal in duodenal ulcer. Considerable variation existed in the percentages of the 3 other metabolite categories in the different pathologies, but the number of patients was t small to establish definite trends.

7398 THE EFFECT OF EXPERIMENTAL HEPATIC CONGESTION ON THE ^{131}I ROSE BENGAL TEST, SERUM TRANSAMINASES AND THE HISTOLOGICA PICTURE PRESENTED BY THE LIVER. (Ger.)

Breining, H. (U. Erlangen-Nuremberg, Germany) O. Strubelt, H. Wust and B. Helpap. Z. Gastroent. 5(1):20-25, 1967.

Rats (180-350 g) were subjected to partial occlusion of the hepatic veins. During 2 int after operation, the animals underwent (1) th ^{131}I rose bengal test, (2) determination of and SGOT, (3) paper electrophoresis of serum establish protein levels, and (4) histologic examination of the liver; 11 rats were in Gr 1, tested between 4 and 5 wk. after operatio and 25 in Group 2, tested between 10-12 wk. after surgery. Liver excretion of rose beng in Group 1 and the controls was the same; Gr 2 animals, however, showed a decrease of 25% rate of dye excretion as compared to the controls. SGPT was increased from 35 (contr to 80.9 U/ml and SGOT from 76.5 (control) to 117.7 U/ml in Group 2. Transaminase levels Group 1 were not significantly increased. I neither group was there any significant chan in serum proteins; no decrease of albumin or increase of gamma globulin was observed. Histologically only very minor pathological changes were encountered in the experimental animals; occasional livers showed increased blood vol. in the central thickened veins an the sinusoids; in a single case collagen deposition was seen in the central acinar reticulum with fibrosis and activation of mesenchyma. Histologic differences between 2 groups were not evident. The observed cha of liver function probably arose from defici oxygenation of hepatic tissue. The rose ben and serum transaminase tests seem to be usef indicators of hepatic damage caused by defic blood flow.

7399 THE INTRAVENOUS GALACTOSE TOLERANCE AS AN INDEX OF LIVER FUNCTION. (Ge

Rommel, K. (U. Giessen, Germany), R. Böhmer W. E. Adam. Schweiz. Med. Wschr. 97(15):484 1967.

One group had normal, the other group diseas livers, proved by extensive clinical and

ratory findings, secured by biopsy in each
on. Galactose (0.125 g/kg body wt.) was inj.
in 2 min. into the fasting subject.
nning 10 min. after inj., blood samples were
n at 5-min. intervals and analyzed for
ctose. Under the same conditions in 4 nor-
subjects a tracer dose of 25 μc of radioactive
ctose was inj.; at various time intervals
een 3 and 20 and between 13 and 32 min.
d samples were obtained, the plasma taken up
ilter paper, ashed, and the radioactivity
rtained in a scintillation counter. The
lts were plotted on a half-logarithmic
; (the conc. of a substance decreases
nentially when it is being eliminated from
blood). The curves obtained with the radio-
ve galactose were different from those
ined by analysis of whole galactose in the
d, because radioactive breakdown products of
sugar remained in the blood yielding higher
es. The rate of galactose elimination from
d in subjects with damaged livers was one-
d less than in healthy subjects. The blood
l decreased about 6.2%/min. in those with
tic disease and about 10% in the normal.
differences were statistically significant
roup av. The wide individual ranges which
lapped between the 2 groups preclude the use
his test. Radioactive galactose should be
ul to demonstrate partition of the sugar in
etion, storage, and metabolism.

NONSPECIFIC ESTERASE ACTIVITY (TOTAL
AND FRACTIONATED) IN LIVER DISORDERS OF
DHOOD. (PRELIMINARY STUDY). (It.)
ascale, A. (Civil Hosp., Padua, Italy) and
stuni. Epatologia 12(3):481-487, 1966.

ats treated with P in oil soln., 1:1000, 5
0 ml, i.m., single dose, 24 hr. prior to
ifice, total serum esterase activity ranged
2800-3400 U in the presence of moderate
liver and from 1500-1800 U in the presence
evere fatty liver, as compared to a range of
-5180 U in intact controls. In rats admin.
i.m., 1 and 3 ml, single dose, 24 hr. before
ifice, it ranged from 2600-3400 U in the
ence of moderate necrosis and from 1400-2800
the presence of severe necrosis. Comparable
ations for fluoride-resistant serum esterase
ity were 940-1100 U, 810-960 U, 2400-3300
ontrols), 1040-1620 U and 720-940 U, resp.
ranges of total serum esterase and fluoride-
tant serum esterase activity were also
rmined for 30 normal adult human subjects,
ollows: 280-345 U and 30-46 U, resp. For
ealthy children, aged 3-12 yr., comparable
es were 480-585 U and 50-61 U, resp; for 45
dren with viral hepatitis, they were 320-520
69-106 U, resp.; for 18 children with
, noninfectious liver disorders, they were
20 U and 30-64 U, resp. It is concluded
the onset of viral hepatitis is accompanied
significant decrease of total serum
ase and a concomitant rise of fluoride-resistant serum esterase activity. In cases which recovered promptly, both values were normalized progressively; in cases which recovered only slowly, both values tended to remain abnormal for considerable periods of time, with decrease and increase, resp., directly in proportion to the extent of hepatocellular damage.

7401 EXTRACORPOREAL ASSIST. LIVER, SPLEEN, AND LUNG. (E.)(Rev.) Eiseman, B. (U. Kentucky Med. Sch., Lexington). Scand. J. Gastroent. 1(4):241-247, 1967.

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Silva, J. (Trop. Dis. Inst., Mexico City) and C. M. Pasquel. *Rev. Invest. Salud Publica* 27(1): 61-64, 1967.

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498 LIVER DAMAGE AND DEATH AFTER SURVIVAL OF SEVERE LIVING CONDITIONS. (Ger.) ietze, A. (Med. Service for Schleswig-Holstein, eumunster, Germany). Acta Hepatosplen. Stuttgart) 14(2):104-109, 1967.

he incidence of liver disease was investigated n a group of 308 soldiers, imprisoned, subseuently returned home, and deceased during the eriod of 1948-1964. These individuals had all een examined clinically and many by laparoscopy nd biopsy; all were autopsied after death; 63 ere known while living to have had liver disease; iver disorders were proved in 9 by postmortem xamination. All had lived for a long time under xtreme conditions of poor or deficient diet and ncreased risk of infection by hepatitis and limentary disorders. The incidence of liver isease in the general population, not living nder extreme conditions during the same period, as 3-6%. Among the former prisoners, 72 (23%) uffered severe liver disorders; liver disease as the direct cause of death in 46 cases (15%), nd was a strong contributing factor in the death f 26 (8%). The causes of death among the 72 ith severe liver disease were: Death directly ue to liver disease, 46 cases; 34 died in epatic coma; 10 from hemorrhage, esophageal, tc.; and 2 from primary hepatic carcinoma in irrhotic livers. The 26 deaths to which liver isease was a contributing factor were: 3 cases f carcinoma of the respiratory tract; 6 cases f other types of carcinoma; 7 deaths during bdominal surgery; 3 cases of cardiac infarct nd coronary sclerosis; 2 of heart failure and ndocarditis; 2 of pulmonary tuberculosis; 1 of hronic bronchitis; 1 of hypertension; and 1 of ccident.

499 THE LIVER AND CONSUMPTION OF BEER. (Ger.) Frank, H. (Sophia Hosp., ienna), W. Heil and I. Leodolter. Munchen. ed. Wschr. 109(16):892-897, 1967.

he connection between long term and excessive eer drinking and liver damage was investigated n 450 men, (1) 200 of them brewery workers, 2) 100 metal workers from a plant in the vicinity f the brewery, and (3) 150 other metal workers mployed at a distance from the brewery. Medical istories were taken with special reference to aundice, diabetes mellitus, and abdominal operaions to rule out other toxic conditions damaging o the liver. The workers' drinking habits ere established by personally questioning each ne. The subjects were thoroughly examined and he size of liver determined; they then underent an extensive battery of tests including iopsies. There was 80% agreement with respect o hepatic damage indicated by the BSP test and etermined by histology. In retrospect, the etermination of serum enzyme activities was f least value in the assessment of chronic damage o liver parenchyma. The 3 tests which showed the highest correlation in indicating the degree of liver damage caused by alcohol were: measurement of size of liver, BSP excretion test and histology. The authors state that the age distribution (20-65 yr.) was about the same in the 3 groups, but 99 (49.5%) of the brewery workers were between 51 and 65 yr. old, 45 (45%) of Group 2 were in this age bracket, but only 41 (27.3%) of Group 3. The daily consumption of alcohol in the form of beer established the categories of light drinkers (less than 80 g of alcohol or less than 4.5 liters of beer), medium drinkers (between 80 and 160 g of alcohol), and heavy drinkers (over 160 g of alcohol). Group 1 had 47 light (11), 113 medium (24), and 40 heavy (17) drinkers, with the incidence of liver damage in parentheses. The distribution in Group 2 was 68 light (10), 24 medium (7) and 8 heavy (7) drinkers. Group 3 had 90 light (3), 42 medium (5) and 18 heavy (6) drinkers. In Group 1 52 (26%) had damaged livers; in Group 2 22 (22%), and in Group 3 14 (9.3%). No case of malnutrition was observed among the 450 subjects. In the age bracket to 35 yr. liver damage occurred in 18% of Group 1, 16% of Group 2 and 4.5% of Group 3; in the span 36-50 yr. the percentages were, resp., 17, 22, and 6.1; and in the age group of 51-65 yr., the percentages were 33, 27, and 20. These are the percentages of the number of men of the particular group in the designated age category. The incidence of liver damage increased significantly with increased daily consumption of alcohol and with increasing age.

7500 LIVER CHANGES CAUSED BY ENDOTOXIN DURING PREGNANCY. (Ger.) Székesi, J. (Johannes Hosp., Budapest, Hungary). Zbl. Gynaek. 89(6):202-205, 1967.

Gravid white rats (16.5-18.5 days) were inj. i.p. with LD_{10} dose of endotoxin of Serratia marcescens. Animals were killed 1, 4, 24, and 48 hr. after inj. and the organs prepared for histologic examination. Of 16 gravid rats, 15 (94%) showed definite evidence of liver damage; damage to the kidney had occurred in 9 (56%), in the lungs in 6 (38), in the adrenals in 3 (19%) and in the spleen in 2 (13%). Endotoxin damage to all these organs has been adequately described except for the liver. One hr. after endotoxin inj. the liver showed definite hyperemia; 4 hr. after inj. numerous microthrombi appeared in the hepatic vessels in the first instance in the capillaries; the thrombi arose from aggregations of thrombocytes. The picture 24 and 48 hr. after inj. was one of destructive, continuing necrosis. The thromboses were accompanied by bleeding and necrosis, later surrounded and infiltrated by macrophages. By contrast the nongravid controls showed only hyperemia of the liver.

7501 LIVER DAMAGE CAUSED BY DIFFERENT TYPES OF ALCOHOLIC BEVERAGES. (Ger.)

Lelbach, W. K. (Med. Univ. Bonn, Germany). Deutsch. Med. Wschr. 92(6):233-238, 1967.

A survey was made among 525 institutionalized alcoholics as to the type of beverage consumed, the daily intake of alcohol in g and the duration of the drinking habit for correlation with the type and degree of liver damage assessed in these patients by the following tests: (1) BSP, (2) urobilinogen, (3) serum bilirubin, (4) SGPT and SGOT, (5) alkaline phosphatase, (6) cholinesterase, (7) thymol turbidity, (8) Takata, (9) total protein, and albumin and globulin determinations. Patients (75) were also biopsied. Only beer was consumed by 229 (49.3%), 27 (5.1%) drank beer in combination with other drinks of low alcoholic content, 44 (8.4%) were wine drinkers only or wine in combination with other low alcoholic beverages, 5 (1.0%) drank vermouth alone or with other low alcoholic beverages, and 190 (36.2%) consumed spirits alone or with other alcoholic drinks. Little or no statistical difference was found between beer and liquor drinkers with respect to liver damage; there was a close correlation between the amount of daily alcohol consumption and liver damage, and especially between the duration of the drinking habit and liver damage. The type of drink apparently has no effect upon the degree of liver damage. The 40 beer drinkers (B) and the 35 liquor drinkers (L) with liver biopsies had the following histologically-verified conditions: (a) 12% B, 17% L were histologically normal; (b) 30% B, 20% L had fatty infiltration of the parenchyma without inflammatory mesenchymal changes; (c) 15% B, 12% L had fatty infiltration with inflammation; (d) 10% B, 20% L chronic hepatitis with and without fatty infiltration; (e) 33% B, 31% L cirrhosis. These 2 groups were matched in the daily consumption of alcohol. It is apparent that the central factor in liver damage among alcoholics is the alcohol itself.

7502 LIVER DAMAGE IN CHRONIC ALCOHOLISM. (Ger.) Lelbach, W. K. (U. Bonn, Venusberg, Germany). Acta Hepatosplen. (Stuttgart) 94(1):9-39, 1967.

Liver biopsies were obtained from 320 alcoholics; the histological findings were correlated with age, duration of alcoholic abuse, and amount of alcohol consumed/day. These alcoholics were on withdrawal for an av. of 10-12 wk. In only 22% was no pathologic change observed; 38% had fatty liver; 40% showed more severe hepatic damage. Cirrhosis was present in 12%. The severity of histologic liver damage increased with the mean age of the case and with the duration of the alcoholism and the amount consumed per day. When the amount consumed exceeded 160 g/day the pathological changes in the liver were more pronounced than when the alcoholic consumption was less than 160 g/day; this difference was statistically significant as was the duration of alcoholic abuse; thus cirrhosis was found in every fourth alcoholic of 12-13 yr. duration; after 22 yr. cirrhosis was found in every secon individual. The incidence of lesions such as fatty liver complicated by inflammation increase steadily up to a mean alcohol abuse of 13 yr. Cirrhosis was mostly in the compensated form, yet a wide pattern of laboratory tests showed normal profiles in only 4% of the cases. There was no evidence that antecedent hepatotropic diseases (especially viral hepatitis) in any way determined the severity of the histological changes in the biopsies. No conclusive evidenc of the presence of dietary deficiencies was observed in these cases. Further analyses of clinical and biochemical findings from this group showed that continuous ingestion of alcoh for an av. period of more than 10 yr. in an amount surpassing the daily rate of ethanol metabolism seems to be required for the development of severe liver damage. Greater daily consumption may decrease the time required for damage to the liver although there is no eviden for this. The individual capacity of alcohol metabolism (0.1 g/kg/hr., ± 33%) may determine any given person the amount which, taken continuously, will prove injurious to his liver.

7503 EFFECT OF CERTAIN ANABOLIZING STEROID ON THE IN VITRO CONJUGATION OF BSP WITH GSH IN RAT LIVER. (It.) Di Toro, R. (U. Naples, Italy), L. Lupi, V. Ansanelli and A. D'Angelo. Epatologia 12(4):757-762, 1966.

Among virgin female Wistar rats weighing approx 250 g at the start of the experiment and treate with 19-nortestosterone phenylpropionate, 500 μg/dose, i.m. every 5 days for 1 mo., the mean percentage of BSP bound to reduced glutathione in the liver was 66.9%, with a range of 60-74% (controls; 51.6%, with a range of 46-59%). Among another group treated with 4-chlortestosterone acetate, 1 mg/dose, i.m. every 5 days f 1 mo., the mean percentage of BSP bound to redu glutathione was 55%, with a range of 49-61% (co trols: 42%, with a range of 36-46%). Among 4 the animals treated with 19-nortestosterone phenylpropionate, the total reduced glutathione content of the liver ranged from 0.35-1.74 mg/g fresh tissue (mean, 0.8725 mg/g); among 4 contr it ranged from 1.13-2.20 mg/g (mean, 1.595 mg/g Some degree of damage to liver cells was seen in almost all treated animals which were examin consisting of a spongy appearance of the cytoplasm and varying degrees of vacuolization, up to and including a total loss of cytoplasm accompanied by pyknosis and/or chromatolysis of the nuclei. However, such damage was limited t the interlobular regions and relatively restric zones of the parenchyma close to the centrilobu vein. In no case was there any significant alteration of hepatic lobular architecture.

7504 DECREASED RESPONSE OF BLOOD PRESSURE TO SYNTHETIC ANGIOTENSIN II IN RATS WITH CCl_4-INDUCED LIVER CIRRHOSIS. (Ger.) Dal Palù, C. (U. Padua, Italy), R. Miori, Zuin and F. Dornetti. Med. Pharmacol. Exp. sel) 16(3):245-250, 1967.

te rats (120 g initial wt.) were chronically soned by inhalation of CCl_4 vapor, admin. ce daily for a wk., then once/day for 11 mo. od pressure was measured at intervals; od pressure was also measured before and er i.p. inj. of angiotensin II (0.2 ml of a sh soln. in 5% glucose containing 0.04 μg; . was by a microsyringe). Blood pressure was en 3-8 times 1'30"-4'30" after inj. and the ues av. The pressures were taken using a f placed about the base of the tail with a nsducer recording on a direct-writing electro- diogram. During 0-2 mo. the chronically- soned rats showed an av. increase of systolic ssure of + 13.1 ± 1.2 mm Hg when inj. with iotensin; the controls had an av. increase er inj. in this period of + 12.1 ± 1.4 mm Hg; difference was not significant. In the in- val from 3-11 mo. the chronically-poisoned s showed an av. increase of systolic blood ssure after inj. of only + 0.29 ± 0.8 mm Hg; av. increase for the controls from 3-11 mo. + 9.74 ± 1.9 mm Hg. This difference was hly significant. The pressures before inj. angiotensin in both groups were essentially same in early and late periods. This effect ch is not seen in acute intoxication tends appear in the early stage of fatty infiltra- n, before proliferation of connective tissue apparent in the liver. It has been observed t patients with icterogenic hepatitis and se with ascitogenic cirrhosis are more sus- tible to angiotensin than earlier or less te forms. The cause is unknown. The experi- tal results seem to exclude tachyphylaxis ards angiotensin.

5 HISTOCHEMICAL AND ELECTRON MICROSCOPE FINDINGS IN ENLARGED LIVERS INDUCED BY EIGN SUBSTANCES IN WHITE MICE. (Ger.)

aude, G. (U. Marburg/Lahn, Germany), M. Siess, /ogell and J. Niessing. Acta Histochem. na) 26(1):185-201, 1967.

ogether 300 male mice were divided into ups of 20-30 animals for each conc. of each stance used; each experimental group was ched with a control group. Substances, ges and duration of admin. employed were: Phenobarbital, 100 mg/kg/day, i.p., 1-4 wk.; mg/kg/day p.o., 2 wk. (2) Thiopental, 60-100 g/day, s.c., 4 wk. (3) Halothane, 1% in ired air, 60 min. exposure/day, 4 wk. (4) vapor in respired air on 2 or 3 occasions, and vapor conc. not stated, but 25% of the als died of CCl_4 poisoning. (5) Combined thane and thiopental; halothane, 0.7% in ired air, 60 min. exposure and thiopental 00 mg/kg/day, s.c. 4 wk. Animals were killed ecapitation, the liver excised, weighed and ied. The glycogen content was within phy- ogical limits in both groups of substances biturates and halogenated hydrocarbons); fatty degeneration was much more marked after halothane and CCl_4 than after barbiturates. In strongly hypertrophied livers the blood vascular system was engorged with increased vascularization in response to the greatly increased vol. of parenchyma. Phenobarbital caused a large increase in the endoplasmic reticulum which was much swollen and vesiculated. Livers exposed to halothane, on the other hand, showed great increase in the size of mitochondria through swelling. In the livers affected by halothane fatty infiltration was marked, the animals treated by both phenobarbital and halothane showed a combination of the effects produced by each substance.

7506 THE INFLUENCE OF ADRENERGIC β-BLOCKADE ON THE CHLOROFORM-INDUCED FAT DEPOSITION IN THE LIVER. (Ger.)

Estler, C. J. (U. Erlangen-Nuremberg, Germany) and H. P. T. Ammon. Z. Ges. Exp. Med. 142(2):117-122, 1967.

Fasted white mice were grouped as: 1) controls, untreated, 2) CCl_4-treated animals: respired 1 vol.% CCl_4 for 2 hr. in a closed system, 3) CCl_4-treated animals inj. s.c. with 50 mg/kg 1-(isopropylamino)-3-(m-toloxy)2-propanol.HCl, a β-sympathicolytic agent, 0.5 hr. prior to CCl_4 treatment, 4) mice inj. with 50 mg/kg of the propanol, s.c., no other treatment. All mice were killed by decapitation and the blood collected 2.5 hr. after inj. or after 2 hr. exposure to CCl_4 vapor. The livers were also excised and frozen. Blood serum was analyzed for free fatty acids, esterified fatty acids, free cholesterol, total cholesterol. Liver tissue was analyzed for esterified fatty acids and total cholesterol. These determinations showed that exposure to 1 vol.% CCl_4 increased the unesterified fatty acids and decreased the esterified fatty acids in serum while increasing the esterified fatty acids in liver tissue. Pretreatment with the propanol derivative hindered lipolysis and the increase of the fat content in the liver, but did not prevent the decrease of fatty acid esters in the serum. These findings suggest that CCl_4-induced lipolysis in the serum and deposition of fat in the liver are mediated by catecholamines.

7507 STUDIES ON THE MECHANISM OF ENZYME INDUCTION. X. BARBITAL ACTION ON THE SUBSTRUCTURE OF LIVER CELLS OF DIFFERENTLY AGED RATS. (Ger.)

Franke, H. (U. Jena, Germany) and W. Klinger. Acta Biol. Med. German. 18(1): 99-119, 1967.

Infant rats received sodium barbital (150 mg/kg/day, i.p.) on days 3, 4, and 5 of life for some and on days 7, 8, and 9 for others; a 12-mo.-old male rat was inj. with sodium barbital (150 mg/kg/day, i.p.) on 3 successive days. The animals were killed on the sixth and tenth days and at 12 mo. and the liver tissue examined by electron microscope at 6300 to 42,000 magnification. The induction of multiplication of smooth membranes in the cytoplasm of liver cells was evident in 6- and 10-day rats treated with sodium barbital; the multiplication of the smooth membranes at 6 days was relatively poor; at 10 days, however, the smooth membranes were much more in evidence, attaining the adult condition in some of the cells. By contrast no multiplication of smooth membranes was observed in the liver cells of the 12-mo.-old male rat. In other individual single liver cells of the sodium barbital-treated animals signs of damage were evident, (swollen, partly destroyed mitochondria, and an ~~atypical~~, finely vesiculated endoplasmic reticulum without increase of smooth membranes). The glycogen granules were distinctly diminished or entirely lacking. Giant mitochondria were observed in some of the cells which showed multiplication of the smooth membranes. There were increased numbers of the "dark liver cells" in the sodium barbital-treated animals; these have been observed in livers having an increased growth rate such as in the newborn and in regenerating livers marking an increased protein synthesis, an active metabolism in conjunction with an increased rate of proliferation.

7508 STUDIES ON LEUCINE AMINOPEPTIDASE IN EXPERIMENTAL HEPATOBILIARY DISORDERS. (Jap.) Makiura, O. (Nara Med. U., Japan). Nara Igaku Zasshi (J. Nara Med. Ass.) 18(1):117-135, 1967.

Leucine aminopeptidase activity in the liver was histochemically studied in parallel with the biochemical determination of enzyme activity in the serum and liver in rats with experimental hepatobiliary lesions. In rats treated with CCl_4, the enzyme activity was markedly increased in the serum, while it was decreased in the liver. Histochemically, no enzyme activity was found in the necrotic regions in the liver, suggesting the release of the enzyme from these regions to the serum. In rats with ligature of the common bile duct, the enzyme activity in the serum was slightly increased, while that in the serum was unchanged through the fourth day after the ligature. High enzyme activity in the bile was noted in cases with high activity in the serum. The gradual increase of enzyme activity in both the serum and liver was found in rats maintained on α-naphthyl isothiocyanate, besides proliferation of the bile ductules, which were found histochemically to be abundant in enzyme activity. In rats fed 3'-methyl-4-dimethylaminoazobenzene, high activity and dense distribution of the enzyme were shown histochemically in the liver fibrosis stage, corresponding to the gradual increase of activity in the serum and liver. A more marked increase in activity in the serum was observed in the hepatoma stage as compared with that in the fibrosis stage. High enzyme activity was shown histochemically in cancer tissue.

7509 STUDIES ON THE MECHANISM OF THE ELEVATION IN SERUM ALKALINE PHOSPHATASE CTIVITY IN THE EXPERIMENTAL HEPATOBILIARY DISORDERS. WITH SPECIAL REFERENCE TO THE SERUM AND LIVER ALKALINE PHOSPHATASE ACTIVITIES ON THE BASIS OF THE HISTOCHEMICAL INVESTIGATION OF THE ENZYME IN THE LIVER. (Jap.) Nishi, T. (Nara Med. U., Japan). Nara Igaku Zasshi (J. Nara Med. Ass.) 18(1):137-153, 1967.

Histochemical studies were done on the activity and distribution of alkaline phosphatase in the liver of rats with experimental hepatic disturbances, in parallel with biochemical studies of the enzyme activity in the serum and liver. In rats treated with CCl_4, an increase of enzyme activity in the serum and liver was observed. Histochemically, no enzyme activity was found in the necrotizing liver cells while higher activit was found in the remaining normal cells as compa with that in the liver cells in the control; the facts suggest the release of the enzyme during t process of necrosis. In rats with ligature of the common bile duct, a marked increase of the enzyme activity was found in both the serum and liver. The highest activity throughout the stu and uniformly dense distribution of the enzyme was shown histochemically in the liver, especial along the bile capillaries and dilated bile duct and the diffusion of the enzyme from the bile d into the neighboring Glisson's sheath was noted. Feeding of α-naphthyl isothiocyanate induced an increase of the enzyme activity in the serum an liver, and histochemical studies revealed marke enzyme activity in the proliferating bile ductu and liver cells. During feeding, mild depletio of enzyme activity in both the serum and liver was temporarily noted, presumably due to the zonal difference in enzyme distribution or reduced enzyme formation in the atrophied or degenerated liver cells. Feeding of 3'-methyl-4-dimethylaminoazobenzene induced less increase i the enzyme activity in the serum and liver than the former treatments. During the course of fee-ing, the serum enzyme activity first increased, then decreased, and increased again. Prolifera of the connective tissue had no relation to increase of the serum enzyme activity in the stag of liver fibrosis induced by the feeding, while the hepatoma cells which were induced, had high enzyme activity.

7510 INFLUENCE OF HYDRAZINE ON THE DISTRIB TIONS OF FREE AMINO ACIDS IN MOUSE LIVER. (E.) Simonsen, D. G. (City of Hope Med Ctr., Duarte, Calif.) and E. Roberts. Proc. So Exp. Biol. Med. 124(3):806-811, 1967.

Using two-dimensional paper chromatography, the amino acid pattern in the liver of rats given hydrazine inj. (3 mM/kg) 30 min. after i.p. inj of saline, arginine, alanine, glutamic acid or mixture of all 3 acids in equal parts showed in-creased quantities of citrulline which were not reflected in the urine or other tissues. Inj. of arginine, alone or in combination with alani and glutamic acid, followed by hydrazine admin. resulted in marked increase in levels of ornith and smaller elevations in glycine, serine and threonine levels as compared to rats treated wi

ydrazine alone, and no increase in glutamic
d aspartic acid components. Protection against
ydrazine toxicity was enhanced when all 3 acids
ere given. No evidence of argininosuccinic
id accumulation in the liver was observed,
ggesting that hydrazine operates at the con-
nsation point of citrulline and aspartic acid,
ich may be rate-limited itself.

11 CHEMICAL, HISTOLOGIC AND IMMUNOLOGIC
RESPONSES IN RATS TO CCl_4. II.
LATIVE INFLUENCE OF CHOLINE DEFICIENCY. (E.)
dson, V. N. (U. Michigan, Ann Arbor), D. F.
tchum and R. De Mott Friberg. Proc. Soc. Exp.
ol. Med. 124(3):966-969, 1967.

le albino Sprague-Dawley rats were divided into
groups: 1) normal controls fed a regular
et; 2) and 3) those fed a choline-deficient
et for 2 or 4 wk. before exposure to CCl_4 (0.25-
50 ml) and 4) those fed a regular diet but
posed to CCl_4. The lipid and hydroxyproline
ntent and histology of the livers were studied;
d antiliver factors were determined by hemag-
utination and precipitin methods and skin tests
ilizing extracts prepared from normal and
l_4-exposed (single 0.25 ml s.c. inj. 4 hr.,
hr. or 5 days beforehand) rats. Deficiency
choline produced the greatest lipidosis in
e liver and was associated with a high pre-
lence of antiliver serum factors by hemagglu-
nation. The degree of lipidosis was related
the duration of choline deficiency; 6 wk.
choline deficiency produced a mean liver lipid
nc. of 75.3%, compared to 38.4% with a 4-wk.
oline deficiency and 11.6% for normal controls.
l_4 influenced these parameters very little
der the conditions of these experiments.

12 ALTERATIONS IN MICROSOMAL ELECTRON
TRANSPORT, OXIDATIVE N-DEMETHYLATION
D AZO-DYE CLEAVAGE IN CARBON TETRACHLORIDE AND
METHYLNITROSAMINE-INDUCED LIVER INJURY. (E.)
uckler, E. A. (U. Washington, Seattle), E.
rhenius and T. Hultin. Biochem. J. 103(1):
-64, 1967.

e effect of admin. of CCl_4 (0.25 ml/100 g body
. dissolved in an equal vol. of mineral oil)
d dimethylnitrosamine (2 ml/100 g body wt.,
ssolved in water) in vivo on hepatic microsomal
nction related to drug metabolism was measured
male Sprague-Dawley rats. The capacity of
olated microsomes to demethylate dimethylaniline
s diminished during the first hr. after CCl_4
isoning and during the second hr. after dimethyl-
trosamine poisoning. Thereafter the microsomes
om CCl_4-poisoned livers showed a continuous
cline in activity so that at 24 hr. there was
ttle residual capacity to undertake demethyla-
on. Microsomes from dimethylnitrosamine-
isoned rats were not different from controls
24 hr. During the first 3 hr. there was a
ansient rise in the accumulation of the N-oxide
termediate in CCl_4-poisoned livers, with a
subsequent fall to below control values. In dimethylnitrosamine poisoning there was a parallel decrease in N-oxide accumulation with decreased demethylation. In the latter part of the first 24 hr., the ratio of N-oxide accumulation to demethylation was increased in both instances. There was no evidence of altered reduced nicotinamide adenine dinucleotide phosphate-dependent neotetrazolium reduction or lipid peroxidation at 2 hr. after poisoning with either compound. Reduced nicotinamide adenine dinucleotide phosphate-dependent azo-dye cleavage was decreased. There was no difference in microsomal cytochrome b_5 content, but there was a decrease in the amount of cytochrome P-450; this latter change was correlated with the decreased capacity for reduced nicotinamide adenine dinucleotide phosphate-dependent oxidative demethylation. It is suggested that dimethylnitrosamine is associated with a defect in microsomal reduced nicotinamide adenine dinucleotide phosphate-dependent electron transport at the level of cytochrome P-450. CCl_4 is associated with a second severe block involving the release of formaldehyde from the N-oxide intermediate, in addition to affecting cytochrome P-450.

7513 THE EFFECT OF THE AFLATOXINS B_1, G_1 AND G_2 ON PROTEIN AND NUCLEIC ACID SYNTHESIS IN RAT LIVER. (E.) Clifford, J. I. (Univ. Coll. Hosp. Med. Sch., London), K. R. Rees and M. E. M. Stevens. Biochem. J. 103(1): 258-261, 1967.

The interaction of aflatoxin G_1 and G_2 with calf-thymus DNA (1.99 mM) was compared with that of aflatoxin B_1 (conc. of each toxin was 64.0 μM); changes in difference spectra of G_1 and G_2 were considerably smaller than those with B_1. The effect of a range of conc. of the various aflatoxins was tested on the incorporation of [^{14}C]-orotic acid into the RNA of the liver slices prepared from control rats; B_1 produced a much greater inhibition than G_1 and G_2. The effect of the various aflatoxins on the incorporation of DL-[1-^{14}C]leucine into the proteins of rat-liver slices was also studied (conc. of toxin in mμmoles in 3 ml; aflatoxin and % inhibition were, resp.: B_1, 20 and 40, 32% and 55%; G_1, 150 and 300, 35% and 62%; and G_2, 230 and 460, 38% and 83%); the different conc. of the toxins used produced an inhibition of the same order in amino acid incorporation into the proteins of the liver slice. The effect of aflatoxin B_1 on the RNA-polymerase activity of liver-cell nucleoli was studied in 2 experiments; each reaction mixture in the first experiment contained all the nucleoli isolated from 1 rat liver and such a preparation gave an active incorporation of nucleotide into the nucleolar RNA; addition of several conc. of B_1 to the nucleolar preparation in vitro was without effect. In the second experiment, rats were poisoned with twice the LD_{50} of aflatoxin B_1 (14 mg) dissolved in dimethylformamide and control rats received the latter alone; there was a marked inhibition in the RNA polymerase of the nucleoli prepared from the livers of the poisoned rats. The extent of the inhibitory action of the aflatoxins on the synthetic reactions was proportional to the degree of spectral shift obtained with their interaction with DNA; coupled with the studies on protein synthesis it is concluded that the toxic action of the aflatoxins is related to their interaction with DNA and that their degree of interaction determines their degree of toxicity. The demonstration of inhibition of RNA polymerase after aflatoxin B_1 poisoning was regarded to be further evidence that inhibition of nuclear RNA synthesis in aflatoxin B_1 poisoning was due to the toxin interacting with DNA, and thereby preventing a transcription of the DNA.

7514 A DECREASED PRODUCTION OF PORPHYRINS AND VARIATIONS IN THE HEPATIC AND ERYTHROCYTE CONCENTRATION OF ATP DURING ACUTE ALCOHOL INTOXICATION IN THE RAT. (Fr.) Gajdos, A. (Hotel Dieu, Paris), M. Gajdos-Török, A. Palma-Carlos and L. Palma-Carlos. Nouv. Rev. Franc. Hemat. 7(1):15-26, 1967.

When female white rats were admin. 3 i.p. inj./day of 7.5 ml/kg of 33% alcohol for 8 days, the porphyrin metabolism was altered in the following manner: increases were seen in the urinary excretion of porphobilinogen and uroporphyrin and in the level of ether-soluble porphyrins in the liver and red blood cells. In addition, this intoxication caused an important and early decrease in the hepatic level of adenosine triphosphate (ATP) and, less constantly, the accumulation of reduced diphosphonucleotide (DPNH) in the hepatic tissue. An increase in reticulocytosis and in the ATP conc. in the circulating RBC was also seen, as well as a slight but statistically significant anemia. When daily doses of adenosine monophosphate (AMP, 20 mg, i.m.) were admin. simultaneously with the alcohol these biochemical irregularities in porphyrin metabolism were improved in the liver but the high levels of free porphyrins and of ATP in the RBC were not altered. In addition, neither the anemia nor the reticulocytosis was altered by the AMP treatment. When 15 ml/kg was admin. for 2 days, in those animals which survived this strong intoxication, a decrease in the AT and an increase in the ether-soluble porphyrins, total lipids, DPN and DPNH in hepatic tissue was seen. These factors were also observed only 2 days after 7.5 mg/kg; however the RBC changes had not yet occurred. These data indicate that alcohol intoxication alters 2 modes of porphyrinogenesis; that in the liver by decreasing ATP formation and that in the bone marrow by erythropoietic hyperfunction.

7515 CARBON TETRACHLORIDE EFFECT ON LIVER AUTOTRANSPLANTS WITH TOTALLY REVERSED BLOOD FLOW. (E.) Sigel, B. (Women's Med. Coll., Philadelphia, Pa.), L. B. Baldia, M. R. Dunn and M. E. Dimbiloglu. Nature (London) 213(5082) 1258-1259, 1967.

Following transplantation of the left lateral lobe of the canine liver to the right side of the neck by either "straight" (12) or "reverse" (11) blood flow technic, single i.m. inj. of CCl (0.5 ml/kg body wt.) were admin. 1-23 days after graft establishment. Grafts and residual livers were removed 24 hr. after inj. Tissue preparations of nontransplanted liver showed uniform centrilobular necrosis and lipid accumulation. The general pattern of injury in "straight" blood flow preparations resembled that of nontransplanted livers and was probably the result of the grafting procedure. A similar but more pronounced pattern of central necrosis and lipid accumulation was observed in the "reversed" bloo flow autografts. In the "reversed" group, atrophic alterations due to the grafting procedure increased with the age of the transplant. The results of this experiment present evidence against the hypothesis that the CCl_4 effect on the liver is the result of ischemia.

7516 THROMBOPLASTIN ACTIVITY IN LIVER HOMOGENATES FROM RATS POISONED WITH CCl_4. PRELIMINARY NOTE. (It.) Panputi, F. (U. Bologna, Italy), G. Facchini and G. P. Cremonini. Arch. Path. Clin. Med. 43(2):153-156 1966.

CCl_4 in olive oil (ratio = 1:2; dose = 0.10 ml/100 g, s.c., single dose) was admin. to albin rabbits weighing an av. of 3.2 kg, 12 hr. prior to sacrifice. Quick time in liver homogenates ranged from 30"-37" (mean = 33.5"), as compared to a range of 35"-40" (mean = 37.3") in controls It is suggested that the difference may have resulted from increased lipid content in the livers of intoxicated animals.

7517 EFFECTS OF WHOLE BODY IRRADIATION WITH GAMMA RAYS ON CYSTATHIONASE ACTIVITY IN RAT LIVER. (It.) Moschini, G. B. G. Med. Milit. 116(6):810-817, 1966.

Male Wistar rats weighing approx. 270 g were subjected to varying total amounts of whole-body gamma irradiation, using ^{60}Co as a source and an exposure rate of 70 r per min. In animals receiving 200 r total dose, cystathionase activi in liver homogenates increased progressively to peak at +63% at 48 hr., then decreased to -1% over the next 30 days. In rats receiving 600 r total dose, it decreased progressively to a negative peak of -65% at 48 hr., then increased progressively to reach -9% at the end of the nex 30 days, which was also the end of the observation period. In rats receiving 1000 r, the LD_{100}, it decreased progressively to reach a negative peak of -76% at 48 hr.; recovered to -68% by day 8. On days 12, 16, 24 and 32, it was -76%, -75%, -73% and -73%, resp. It is suggested that the increase of activity demonstratec

response to a total dose of 200 r may have
sulted from increased synthesis of the enzyme,
e to a radiation-stimulated increase of cysteine
tabolism.

18 PHOSPHOLIPID CHANGES DURING HEPATIC INJURY CAUSED BY CARBON TETRACHLORIDE.
.) Sgoutas, D. S. (U. Illinois, Urbana).
tabolism 16(4):382-391, 1967.

le Sprague Dawley rats were starved overnight
d CCl_4 in liquid paraffin (1:1, v/v) was admin.
.5 ml/100 g body wt.) under ether by a stomach
be. Paired controls received 0.25 ml paraf-
n/100 g body wt. All rats were killed 4 hr.
ter treatment, their livers removed, and total
oid extracted. The phospholipid fraction, which
uted with 9% methanol in chloroform on silic
d column chromatography, was hydrolyzed with
kali and the hydrolysis products were subjected
ion exchange chromatography. Phosphatidyl
ycerol was increased 4-fold, and was now a
gnificant component. Phosphatidic acid in-
eased slightly as did phosphatidyl inositol and
e combined sphingomyelin and lysophosphatidyl
oline fraction. Cardiolipin and phosphatidyl
oline remained essentially unchanged, while
osphatidyl serine and phosphatidyl ethanolamine
creased, the latter considerably. Treatment of
ts with CCl_4 caused a considerable reduction
the polyunsaturated fatty acid content of
ospholipids.

9 ORAL CONTRACEPTIVES AND LIVER DAMAGE.
(E.) Sotaniemi, E. (U. Oulu, Finland)
P. A. Järvinen. Excerpta Med. Int. Congr.
. 118 8:208-212, 1967.

jects, 10 postmenopausal women (54-72 yr.-old)
h no history of liver complaints and normal
er function tests at the time of study,
eived estrogen (0.010 mg ethinylestradiol
ly), progesterone (5 mg lynestrol daily on
s 7-28 of menstrual cycle), and a second pro-
terone (5 mg dydrogesterone daily during days
68). Laboratory tests were made at fixed in-
vals: SGOT, SGPT, serum alkaline phosphatase,
mol turbidity, serum bilirubin, and BSP reten-
n (45 min. after i.v. inj. 5 mg/kg BSP). Be-
se of bleeding, 5 subjects discontinued the
lets after 28 days. Bilirubin, alkaline
sphatase, and thymol turbidity levels remained
stant during the study. After 7 days, 4 women
wed increased BSP retention; after 21 days, 7;
most returned to normal, only 1 remaining
vated at 68 days. SGPT was increased after 7
s in 2; after 21 days in 7; after 28 days in
SGOT was increased in 1 after 7, 21, and 28
s. Estrogen alone produced slight changes
ch were first strengthened by progesterone,
in 28 days some adaptation to hormone activa-
n seemed to occur. This was based on the
ardation of hormone inactivation in postmeno-
sal women. Women with a history of disturbed
atic function may be predisposed to jaundice
er admin. of oral contraceptives.

7520 ENZYME HISTOCHEMICAL INVESTIGATIONS OF THE INHIBITORY EFFECT OF ZINC ON THE INJURIOUS ACTION OF CARBON TETRACHLORIDE ON THE LIVER. (E.) Saldeen, T. (U. Lund, Sweden) and U. Brunk. Frankfurt. Z. Path. 76(4):419-426, 1967.

Liver damage was produced in 20 g white male mice by i.p. inj. of 0.01 ml CCl_4. Twelve hr. before inj. and 12 and 36 hr. after inj., mice received a dose of 0.2 ml $ZnCl_2$ in saline (1 mg/ml) s.c. They were decapitated 48 hr. after inj. of CCl_4. Liver changes were studied histologically, histochemically and biochemically. Mice receiving CCl_4 and $ZnCl_2$ showed a greater increase in alkaline phosphatase activity in the regenerating peripheral zone of liver lobules than those treated with CCl_4 alone. This was not observed with acid phosphatase or esterases. Increased frequency of mitotic figures in this region suggested that the protective effect of Zn may be partly due to activation of alkaline phosphatase during the regeneration phase. With the admin. of Zn alone, there was no observed increase in alkaline phosphatase peripherally. That no differences were found between Zn-dependent and Zn-independent enzymes after admin. of Zn suggests that the protective effect was most likely not due to an activation of Zn-dependent enzymes.

7521 EXPERIMENTAL ALLERGIC HEPATITIS. CORRELATION BETWEEN THE MORPHOLOGICAL CHANGES AND LIVER FUNCTION. (E.) Hamamoto, Y. (Osaka Med. Coll., Japan). Acta Path. Jap. 16(3): 287-299, 1966.

Six rabbits were sensitized against bovine RBC by i.v. inj. of 5 ml of a 5% suspension of bovine RBC until the hemolysin titer of rabbit serum against bovine RBC was 1:1280. A provocative inj. of a 20% saline suspension of bovine RBC was admin. by portal vein or hepatic artery. Controls were sensitized rabbits without provocative inj. and untreated rabbits inj. with a single dose of bovine RBC. Liver function tests were: total serum protein and serum protein electrophoresis; icterus index; Co-reaction; cephalin-cholesterol flocculation test; thymol reaction; Rugol reaction; Takata reaction. Rabbits showed focal necrosis of hepatic cells, exudates around the portal vein, portal thrombosis, fibrinoid swelling of the wall of the hepatic artery. Biochemical tests showed only slight damage of liver function. There was no difference whether inj. was by portal vein or hepatic artery. For reversed anaphylaxis 24 rabbits received an i.v. inj. 1.5 ml of anti-rabbit RBC guinea pig serum (hemolytic titer 32-64) in the hepatic artery or portal vein. Controls were rabbits inj. with normal guinea pig serum. Liver changes, similar but more extensive than above, were thought to be due to intravascular fibrin deposition. Functional tests showed more severe damage until a basic similarity with human liver cirrhosis was noticed. There were no significnt changes in controls. It is suggested that anaphylaxis may be implicated in the etiology of human hepatitis.

7522 EFFECTS OF NUCLEIC ACID PRECURSORS ON LIVER INJURIES. I. TREATMENT OF LIVER INJURY INDUCED BY LOW PROTEIN, AMINO ACID IMBALANCED DIET WITH AICA AND AICA OROTATE IN MASSIVE DOSES. (E.) Hashimoto, S. (Western Reserve U., Cleveland, Ohio). J. Vitamin. (Kyoto) 13(1):9-18, 1967.

Rats were maintained on a low protein and amino acid imbalanced diet for 11 wk. to induce fatty livers and were then divided into 3 groups: 1) received a 20% casein diet (controls); 2) the same diet plus 1.6 g/kg body wt. daily of 1% 4-amino-5-imidazolecarboxamide (AICA); 3) the same diet but 3.2 g/kg body wt. of 2% AICA orotate daily, for 4 additional wk. Some were killed at 3, 5, 7, 9, 11, and 15 wk. for study. Low protein increased liver phospholipid slightly and neutral lipid and cholesterol ester fractions markedly. With 20% casein, increase in neutral lipid and cholesterol continued in Group 1, but not in 2 or 3. The iodine number of liver fatty acid gradually increased with low protein diet, especially in neutral lipid and cholesterol ester fractions. In Group 1, the iodine number in phospholipid tended to recover, while those in neutral lipid continued to decrease. In Groups 2 and 3 the iodine number in phospholipid increased less than, but those in neutral lipid increased more than in Group 1. Low protein diet caused liver fibrogenesis, which was inhibited by AICA orotate, while AICA ahd an inhibitory effect on recovery of fibrosis. There was no difference in liver protein between the 3 groups after feeding with 20% casein diet. Serum ornithine carbamyl transferase rose on low protein and decreased in all groups on 20% casein. Vacuolar degeneration, which developed on low protein, was reduced on 20% casein. The low protein decrease in Palade granules was reversed in all groups on 20% casein. It is suggested that AICA not be used alone, to prevent metabolic imbalance of nucleic acids.

7523 THE 2 HOUR SULFOBROMOPHTHALEIN RETENTION TEST AND THE TRANSAMINASE ACTIVITY DURING ORAL CONTRACEPTIVE THERAPY. (E.) Larsson-Cohn, U. (Univ. Hosp., Uppsala, Sweden). Amer. J. Obstet. Gynec. 98(2):188-193, 1967.

The subjects were 22 student nurses (21-26 yr.), all but 1 of whom were unmarried and nulliparous. Ten used Conluten (2 mg norethindrone plus 0.1 mg ethinyl estradiol-3-methyl ester; 21 days of 28), 5 received Volidan (4 mg megesterol acetate plus 0.05 mg ethinyl estradiol; days 5-24), 1 received Anconcen (3 mg chlormadinone acetate plus 0.1 mg ethinyl estradiol-3-methyl ester; 21 days of 28), and 1 received Lyndiol mite (2.5 mg Lynestrol plus 0.075 mg ethinyl estradiol-3-methyl ester; 22 days of 28). All 5 Volidan patients switche to Conluten because of breakthrough bleeding. Serial determination of BSP retention (2 hr. after inj. of 20 mg/kg body wt.), SGPT, and SG were made on subjects before, during, and afte 1 yr. on oral contraceptives. Increased dye r tention (2% or more) was observed in 16 subjec and in 44% of all dye tests performed during t study. Six had elevated SGOT values, 11 eleva SGPT. The frequency of elevated transaminases reached max. after 1 mo. therapy and gradually decreased, while frequency of dye retention reached max. after 3 mo. and remained constant There were observed similarities between signs of abnormal liver function observed during ora contraceptive therapy, in the last trimester o pregnancy, and with idiopathic jaundice of pre nancy. There were 3 cases of toxic reaction t BSP. Despite the increased sensitivity of the modified method, 2-hr. dye retention tests are not recommended for similar situations.

7524 PERSISTENT BINDING OF BUTTER YELLOW METABOLITES TO RAT LIVER DNA. (E.) Warwick, G. P. (Roy. Cancer Hosp., London) and J. J. Roberts. Nature (London) 213(5082):1206 1207, 1967.

Metabolites of radioactive butter yellow, (^{3}H- dimethylaminobenzene, specific activity 1.2 cpmmole) were found to bind covalently to live DNA when injected i.p. (150 mg/kg) into 18 Chester Beatty rats (200 g). A study to deter the half-life of DNA-associated radioactivity reported. The specific conc. of the radioacti decreased to half its initial value within 7 d The fact that it remained constant at this lev for 3 mo. suggested an absence of repair. Thi might explain chromosome aberration found in regenerating liver after treatment with carcin gens and may play a role in the latent period carcinogenesis.

7525 NUCLEOLAR CHANGE PRODUCED BY MITHRAM IN RAT HEPATIC CELL. (E.) Kume, F. (U. Utah Coll. Med., Salt Lake City), S. Maruy A. N. D'Agostino and M. Chiga. Exp. Molec. Pa 6(2):254-260, 1967.

One-mo.-old rats (70-90 g) were inj. i.p. with mithramycin (30 µg/100 ml), dissolved in 0.85% saline, and were killed after 30 min. Mithram conc. was determined spectrophotometrically. electron microscopy, tissue was fixed in phosp buffered 1% osmium tetroxide at 4°C, dehydrate in ethanol, embedded in Epon 812, and stained with lead citrate. Nucleoli were examined by light microscopy with azure C supravital stain To estimate % of hepatic parenchymal cells sho ing nucleolar change, 200 cells in the smear were examined. The approx. dose required to p duce nucleolar change in more than 95% of hepa parenchymal cells was determined by the method Deichman and LeBlanc. Mithramycin caused a "r distribution" or "sorting out and coalesence"

cleolar components, similar to that produced
actinomycin D. Coarse granules and fibrillar
mponents were grouped separately. Mithramycin
so caused a separation of the azurophilic and
nazurophilic components, called "nucleolar
rtition". One day after inj. nucleoli of
patic cells showed a normal reticulated pattern,
d hence the nucleolar partition was considered
versible. At the above dose, incomplete par-
tion was observed in 15-25% of the hepatic
lls, complete partition in 75-85%. The in-
bitory effect of mithramycin on DNA-directed
A synthesis is thought to be related to the
cleolar change.

26 EFFECT OF ALPHA-NAPHTHYL-ISOTHIOCYANATE
(ANIT) ON RAT LIVERS, STUDIED WITH
LCHICINE AND WITH ^{3}H-THYMIDINE AUTORADIOGRAPHY.
.) Ungar, H. (Hadassah Med. Sch., Jerusalem)
d I. S. Levij. Exp. Molec. Path. 6(2):232-236,
67.

Naphthyl-isothiocyanate was dissolved in olive
l (150 mg/ml) and 0.1 ml/150 g body wt. was
min. p.o. to 25 rats (10 mg/100 g). Rats were
lled in groups of 5 at 8, 26, 50, 98 and 170
. after admin. Two hr. before killing, all
ts received 1 µc ^{3}H-thymidine/g i.p. Thin
ices of liver were fixed in 10% neutral buffered
rmalin; 8-10 µ paraffin sections were coated
th Kodak NTB-3 emulsion and exposed at 4°C in
e dark for 4 wk.; autoradiographs were stained
th hematoxylin and eosin. In each the number
labeled cells was counted among at least 2000
patocytes, 1000 littoral cells, and 1000 ductal
lls. A nucleus was considered labeled if over-
in with at least 5 grains. In the colchicine
udy, 5 controls received no α-naphthyl-isothio-
anate; 25 received it in the above dose. Rats
re sacrificed on the same schedule as above,
cept that they received an i.p. inj. of 0.2
/g of a 0.1% soln. of colchicine in physio-
gical saline 4 hr. before killing. Thin liver
ices were fixed in Zenker acetic acid and 6 µ
raffin sections were stained with hematoxylin
d eosin. In each rat the number of mitoses was
unted among at least 2000 hepatocytes and 1000
ctal cells. Mitoses among littoral cells could
t be differentiated. After admin. of drug,
nthesis of DNA and mitotic count were tem-
rarily decreased in all types of cells. Among
patocytes, the number of labeled nuclei was
ch smaller at 8 and 26 hr. after admin. than
controls. The number of labeled cells among
le duct epithelium was decreased at 8 hr., but
turned to control after 26 hr. No mitoses
re seen in bile duct epithelium at this stage.
A synthesis in liver cells and bile duct cells
owed a marked increase at 50 hr., and at this
age the number of mitoses and labeled cells
ong both cell populations reached a peak much
eater than normal counts. The increase in DNA
nthesis and mitotic counts among bile duct cells
ceeded that among hepatocytes. The mitotic
unts and the number of labeled hepatocytes and
le duct cells returned to control level by 98
hr. After an initial period of depression, DNA synthesis gradually increased among littoral cells. The marked increase in DNA synthesis and mitotic rate among ductal cells was correlated with a large increase in the number of bile ductules. The results support the theory that newly-formed bile ductules are derived from proliferation of pre-existing ductal epithelium.

7527 THE INCORPORATION OF PROLINE IN EXPERIMENTAL LIVER FIBROSIS. (Ger.) Becker, K. (U. Hamburg-Eppendorf, Germany). Acta Hepatosplen. (Stuttgart) 14(1):42-48, 1967.

White rats (200 g) were studied in 2 series: (1) 40 normal and (2) 16 treated with thioacetamide (0.02% thioacetamide) in the drinking water for 6 mo. After this period the livers of these animals exhibited a well-developed fibrosis. The animals received i.p. inj. of 1 µc ^{14}C-proline; 12, 24, 48, 72 hr. and 1 wk. after inj. the animals were killed by decapitation and bled; blood was washed out of the liver by a saline soln. inj. through the portal vein. Liver tissue, the xiphoid process, and the tail tendon were weighed (wet wt.), homogenized, and the radioactivity of aliquots determined by scintillation counter. The purity of the labeled proline had previously been established by chromatography. The amount of radioactive proline incorporated into the fibrotic livers was over twice that in normal livers. The incorporation of proline into the gelatin of the xiphoid process and the tail tendon reached a max. at 72 hr. The kinetics of collagen metabolism remains the same in normal and cirrhotic animals. The ^{14}C-proline incorporation is increased in liver fibrosis in proportion to the increased collagen content of the fibrosed liver.

7528 THE ISOLATION OF CARCINOGEN-BINDING PROTEIN FROM LIVERS OF RATS GIVEN 4-DIMETHYLAMINOAZOBENZENE. (E.) Ketterer, B. (Middlesex Hosp. Med. Sch., London), P. Ross-Mansell and J. K. Whitehead. Biochem. J. 103(2): 316-324, 1967.

7529 LIGHT AND ELECTRON MICROSCOPIC RADIOAUTOGRAPHY OF HEPATIC CELL NUCLEOLI IN MICE TREATED WITH ACTINOMYCIN D. (E.) De Man, J. C. H. (U. Leiden, Netherlands) and N. J. A. Noorduyn. J. Cell Biol. 33(3):489-496, 1967.

7530 OWREN'S THROMBOTEST AS A TEST OF HEPATIC FUNCTION IN IRRADIATED CANCER PATIENTS. (It.) Dalla Palma, L. (U. Florence, Italy), A. Doni, S. De Marzi, L. Bartoletti, G. Bèrni. Haematologica 51(9):682-696, 1966.

7531 THE INFLUENCE OF NICOTINIC ACID AND VITAMIN B_{12} ON THE EXPERIMENTAL

INTOXICATION CAUSED BY CARBON TETRACHLORIDE IN RATS. (Cz.) Holeček, V. (Charles U., Plzen, Czechoslovakia), M. Kriška and J. Sůva. Plzensky Lek. Sborn. 27:31-39, 1966.

7532 THE INFLUENCE OF NICOTINAMIDE ON THE EXPERIMENTAL INTOXICATION OF RATS CAUSED BY CARBON TETRACHLORIDE. (Cz.) Holeček, V. (Charles U., Plzen, Czechoslovakia), J. Sůva, O. Mayer and M. Kriška. Plzensky Lek. Sborn. 27:19-30, 1966.

7533 NEUROLEPTIC ANALGESIA AND LIVER FUNCTION. (Ger.) Boger, W. P. (Montgomery Hosp., Norristown, Pa.) and F. J. Tornetta. Anaesthesiol. Resus. (Berlin) 9:113-130, 1966.

7534 RELATIVE EFFECTS OF VARIOUS CHLORINATED HYDROCARBONS ON LIVER AND KIDNEY FUNCTION IN DOGS. (E.) Klaassen, C. D. (U. Iowa Coll. Med., Iowa City) and G. L. Plaa. Toxic. Appl. Pharmacol. 10(1):119-131, 1967.

7535 ASSESSMENT OF THE THERAPEUTIC ACTION OF AN ASSOCIATION OF KREBS-HENSELEIT CYCLE SUBSTRATES AND VITAMINS IN HEPATIC TOXICOSIS. (It.) Gai, V. (U. Turin, Italy), L. Gastaldi and G. Nattero. Minerva Med. 58(34 Suppl.): 1585-1586, 1967.

7536 L-ASPARAGINASE: INHIBITION OF EARLY MITOSIS IN REGENERATING RAT LIVER. (E.) Becker, F. F. (New York U. Sch. Med., N. Y.) and J. D. Broome. Science 156(3782):1602-1603, 1967.

7537 HEPATOTOXIC SUBSTANCE IN BRACHYGLOTTIS REPANDA. (E.) Mortimer, P. H. (Ruakura Agr. Res. Ctr., Hamilton, New Zealand) and E. P. White. Nature (London) 214(5094): 1255-1256, 1967.

7538 DIMETHOATE DEGRADATION BY HUMAN LIVER AND ITS SIGNIFICANCE FOR ACUTE TOXICITY. (E.) Uchida, T. (Cornell U., Ithaca, N. Y.) and R. D. O'Brien. Toxic. Appl. Pharmacol. 10(1):89-94, 1967.

7539 CONTRAST STAINING OF THE LIVER--AN INFREQUENT COMPLICATION DURING LYMPHOGRAPHY. (Ger.) Georgi, M. (U. Clin. Heidelberg, Germany). Fortschr. Roentgenstr. 106(6):853-858, 1967.

7540 POTENTIATION OF CARBON TETRACHLORIDE TOXICITY BY DIMETHYL SULPHOXIDE. (E.) Freston, J. W. (Roy. Free Hosp., London) and I. A. D. Bouchier. Nature (London) 214(5089): 734-735, 1967.

7541 VARIATIONS OF SERUM TRANSAMINASE ACTIVITIES (SGOT AND SGPT) IN CHILDRE AFTER ISONIAZID LOAD. (It.) Fantoli, U. (U. Rome), T. Pirolli and M. Anastasio. Ann. Ist. Forlanini 26(4):480-486, 1966.

7542 ENZYME-HISTOCHEMICAL RESPONSE OF THE LIVER TO INTRAVENOUS ADMINISTRATION OF PAPAIN. (Ger.) Hecht, A. (Humboldt U., Berlin). Acta Biol. Med. German. 18(3):397-407 1967.

7543 ELECTRON MICROSCOPIC STUDIES ON THE RAT LIVER AFTER INTOXICATION DUE TO THIOACETAMIDE WITH SPECIAL REFERENCE TO THE INTRAHEPATIC BILE DUCTS. (Ger.) Bader, G. (Friedrich Schiller U., Jena, Germany). Exp. Path. (Jena) 1(2):73-94, 1967.

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7547 PULMONARY TUBERCULOSIS AND LIVER DAMAGE. (Ger.) Vetter, K. (Reg. Cli Berlin), I. Kaschube, G. Doepner and L. H. Kettler. Deutsch. Gesundh. 22(17):783-787, 196

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A SEX DIFFERENCE IN THE EFFECT OF
ETHIONINE ON THE ACTIVITY OF RAT LIVER
ANASE. (E.) Kolenbrander, H. M. (Cent.
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1):184-186, 1967.

CONTRASTIC EFFECTS OF ETHIONINE AND
CARBON TETRACHLORIDE ON ASCORBIC ACID
BOLISM AND ON THE ACTIVITY OF MICROSOMAL
-METABOLIZING ENZYMES IN RATS. (E.) Kato,
Nat. Inst. Hyg. Sci., Tokyo). Jap. J.
macol. 17(1):64-75, 1967.

THE ROLE OF HEPATIC NECROSIS IN THE
PATHOGENESIS OF SPONTANEOUS LACTIC
OSIS. (CONCLUSION). (Fr.) Perret, C.
. U. Lausanne, Switzerland), J. F. Enrico,
ontani, G. Pappalardo, T. Grandjean and G.
zoukas. Schweiz. Med. Wschr. 97(22):702-706,

7553 3-METHYLCHOLANTHRENE AND PHENOBARBITAL STIMULATION OF RAT LIVER RNA POLYMERASE. (E.) Gelboin, H. V. (NIH, Bethesda, Md.), J. S. Wortham and R. G. Wilson. Nature (London) 214(5085):281-283, 1967.

7554 STRUCTURE AND SIGNIFICANCE OF NUCLEAR INCLUSIONS DURING LIVER CARCINOGENESIS INDUCED BY THIOACETAMIDE. (Hun.) Kendrey, G. (Budapest Med. U.). Kiserl. Orvostud. 19(2):192-198, 1967.

7555 HUMAN AND ANIMAL EXPERIMENTAL STUDIES ON LIVER LOADING-AFTER NEUROLEPTIC ANALGESIA. (Ger.) Schellenberger, A. (U. Munich, Germany), A. Doenicke and T. Gürtner. Anaesthesiol. Resus. (Berlin) 18:8-16, 1966.

7556 INFECTIOUS HEPATITIS IN CHILDREN AND GAMMA-GLOBULIN. (Cz.) Hrdlickova, J. (Pediat. Inst., UDL, Prague). Cesk. Pediat. 21(10):871-875, 1966.

Of 3352 children up to 14 yr. old, affected during 1958-1962 in Prague by viral hepatitis, 412 were treated with human γ-globulin up to 3 mo. before the appearance of hepatitis symptoms. The severity of the hepatitis in γ-globulin-treated and untreated children was compared. The length of hospitalization was 16.1 and 14.4 days, the time required for the normalization of hepatitis tests 14.5 and 11.4 days, that for the normalization of urine tests 12.7 and 11.2 days, the duration of jaundice 11.6 and 7.8 days, and the max. levels of bilirubin in the blood 4.13 and 2.83 mg% in untreated and treated groups, resp. All these differences were statistically significant. However, the max. levels of transaminases, and the incidence of recurrences did not differ significantly in the 2 groups. Gamma-globulin was most effective when admin. 8-21 days before hospitalization, but its effect was clearly evident even when applied a few days before the appearance of hepatitis symptoms.

7557 TREATMENT OF VIRAL HEPATITIS IN CHILDREN. (Cz.) Bila, L. (Thomayerov Hops., Prague). Cesk. Pediat. 21(10):880-884, 1966.

The experiences of the authors with the treatment of children suffering from viral hepatitis are described. The children should be hospitalized immediately after the appearance of the first symptoms and rest in the bed until the blood bilirubin content decreases to 1.0-1.5 mg%, the level of transaminases becomes normalized, and the hepatosplenomagaly disappears. The diet should be rich in carbohydrates which can be easily metabolized, poor in fats, and should contain an amount of proteins appropriate to the age of the child. In children with diabetic complications the metabolic balance should be preserved, i.e. amounts of insulin admin. should not be altered. The period when the diet of children contains only carbohydrates should be shortened with these patients. The authors do not recommend treatment of patients with monosaccharides or amino acids. Antibiotics (neomycin, colistin, polymyxin) should be applied only in severe cases. Patients with prolonged and cholestatic forms of viral hepatitis were successfully treated with corticosteroids, especially with prednisone (0.5 mg/kg/day).

7558 THE USE OF CORTICOSTEROIDS AND LYSOZYME IN THE TREATMENT OF CHILDHOOD VIRAL HEPATITIS. (It.) Maggi, M. (C. Arrigo Child. Hosp., Alessandria, Italy) and G. Fossati. Minerva Pediat. 18(33):1958-1960, 1966.

Among 10 children with viral hepatitis, treatmer with lysozyme (15-20 mg/kg/day, p.o.) led to normalization of bilirubinemia in an av. of 19 days, normalization of SGOT and SGPT levels in an av. of 16. Among 13 children receiving the same treatment plus betamethasone (0.1-0.2 mg/kg/day, usually p.o.) the times required for normalization as above were 17 and 17 days, resp Among 23 receiving betamethasone alone, the time required were 18 and 19 days, resp. The 3 patie groups, combined, consisted of 19 boys, 27 girls aged 21 mo.-12 yr. Although no statistically significant differences are shown among the 3 groups, it is suggested that the combined treatment indicated was probably the therapy of choice.

7559 ANABOLIZING STEROIDS IN THE TREATMENT OF VIRAL HEPATITIS. (It.) Tolentino, P. (U. Genoa, Italy). Epatologia 12(3):462-470, 1966.

The mean number of days required to halve above-normal increases of values for serum bilirubin, SGOT, SGPT and MacLagan's Test were tabulated fo 26 children receiving conventional therapy for viral hepatitis, as follows: 8.6, 6.8, 6.9 and 17.8 days, resp. Comparable tabulations for 32 children receiving conventional therapy plus 4-chlortestosterone (0.5 mg/kg/day for 20 days) were: 7.2, 7.0, 6.6 and 12.3 days, resp.; for 12 children receiving conventional therapy plus 4-chlortestosterone as above plus prednisone (1 mg/kg/day for 20 days), they were: 6.1, 4.9, 5.0 and 15.6 days, resp. For 6 children receivi conventional therapy plus successive courses of demecolcine (3-6 mg/day x 3, i.v.), then prednisone (1 mg/kg/day for 3 days), then 4-chlortestosterone (0.5 mg/kg/day for 20 days) they were: 7.7, 3.3, 2.9 and 14.4, resp. Note is made that the improvements shown in 3 of 4 quadrants by the combination of prednisone with 4-chlortestosterone were not at a level of statistical significance; that those shown by the admin. of the 3 drugs in sequence, as concerned serum transaminase levels, approached statistical significance fairly closely.

7560 URIDINE DIPHOSPHOGLUCOSE IN THE TREATMENT OF VIRAL HEPATITIS. (It.) Pagliano Sassi, L. (Hosp. Inst., Milan, Italy) and A. Moreno. Epatologia 12(4):732-738, 1966.

A total of 91 patients of both sexes (5-71 yr. old), took part in a comparative study of 4 therapeutic trials for viral hepatitis. Among 33 of 91 who received uridine diphosphoglucose (20-40 mg/day, i.v.; duration of treatment not indicated), serum bilirubin was normalized withi an av. of 19 days, transaminase levels within an av. of 16 days, clinical status within an av. of 21.3 days. Comparable tabulations for 14 of 91 who received the same treatment plus

ednisone (20-30 mg/day for 15 days, p.o.)
re 20.5, 17.7 and 22.8 days, resp.; for 22
91 who received prednisone along (in associa-
on with tetracycline and conventional therapy),
ey were 25.4, 25.4 and 25.7 days, resp.; for
of 91 who received conventional therapy alone,
ey were 25.2, 24.3 and 28 days, resp. It is
ncluded that uridine diphosphoglucose appears
be a useful addition to the agents available
treating this disorder.

61 TREATMENT OF VIRAL HEPATITIS IN THE
LIGHT OF MANY YEARS OF EXPERIENCE
PEDIATRIC PRACTICE. (It.) Segagni, E.
osp. S. Spirito, Casale Monferrato, Italy).
atologia 12(4):697-692, 1966.

ompt clinical and laboratory improvement was
tained in 40 of 40 children, 1-12 yr. old,
whom viral hepatitis was treated with
ednisone or betamethasone, although 2 of 2
her children failed to show similar response
treatment with dexamethasone. Prompt
sponses were also obtained in 10 of 10, aged
10 yr., who were treated with lysozyme for
days (125-250 mg/day, i.m. plus 100-300
/day, p.o.). Somewhat slower but equally
od results were obtained in 26 of 26, aged
12 yr., who were treated for 10-15 days with
sozyme (4 mg/kg/day, i.m.) plus xenalamine
enovis, 40 mg/kg/day, p.o.). In a correlative
udy, although 5 of 5 puppies used as controls
ccumbed to acute viral hepatitis, there were
mortalities among 4 of 4 who received
tamethasone (0.1 mg/kg/day, p.o.) plus
sozyme (125 mg/day, i.m. and 200 mg/day, p.o.)
us xenalamine (40 mg/kg/day, p.o.) for total
riods of 10-15 days. All the animals recovered
mpletely within a total observation period of
-40 days. It is concluded that all 3 medica-
ons were effective against the disorder and
at the use of all 3 in combination may be the
eatment of choice in severe cases, in the
sence of contraindications.

62 NEW EXPERIENCES MADE IN THE TREATMENT
OF ACUTE VIRAL HEPATITIS. THE EFFECT
CHOLINOROTATE. (Ger.) Wildhirt, E. (City
osp., Kassel, Germany) and H. Selmair. Munchen.
ed. Wschr. 109(16):887-891, 1967.

tients (99) with acute viral hepatitis
tablished by laboratory tests of serum
lirubin conc., protein lability, electrophore-
s, transaminase levels, and serum Fe conc.,
nd by biopsy in 14 cases, were treated with
ed rest, a high protein, low fat diet, hot
oplications in the region of the liver, and the
dmin. of 2 tablets of cholinorotate p.o. three
imes per day. Each tablet contained 500 mg
f cholinorotate (Cholergol), i.e., a combination
f orotic acid and choline. Animal experimenta-
ion showed a more rapid regeneration of damaged
iver tissue following cholinorotate therapy;
he return to normal of fatty livers under this

has also been observed. Among the patients with hepatitis, the tolerance to the substance was outstanding; no side effects were observed. Patients (67) healed without complications in from 3-17 wk. depending upon the severity of the disorder; the times given were to complete recovery in terms of the laboratory findings; 23 cases followed a protracted course; in 14 it became necessary to give adrenal corticoids also. No cure was achieved in 10 patients after 3 mo. of treatment; 7 could not be followed up, 1 case had a postnecrotic, cicatrized liver, and 2 had subchronic hepatitis. A review of the literature revealed that this record in treatment of hepatitis was equaled by some but not exceeded.

7563 RESULTS OF OBSERVATION ON A DISPENSARY LEVEL ON CHILDREN HAVING SUSTAINED EPIDEMIC HEPATITIS. (Rus.) Gol'zand, I. V. (Leningrad Inst. Res. In Pediatric Infectious Diseases, USSR). Vop. Okhr. Materin. Dets. 11(11):45-50, 1966.

A study was made on 472 children (1 yr. of observation, 472; 2 yr., 263; 3 yr., 135; 4 yr., 98; and 5 yr., 57 children) who had viral hepatitis up to 5 yr. previously (69.2% had a moderately severe form; 25.2% a mild form and 5.6% the anicteric form); 249 of them were treated during the acute phase of the disease with hormones and symptomatic therapy, 180 with symptomatic therapy alone, and 35 with chloroquine and symptomatic therapy. At release, hepatomegaly was found in 36.3%, and after 1-5 yr. in 29% of the patients. Hyperbilirubinemia (usually not exceeding 2 mg%) at release was found in 3.6%, and during the entire subsequent observation period it occurred in not more than 7.5% of the patients. A decrease of total protein with an increase in γ-globulins was found in the period of up to 12 mo. in 44% of the convalescents who had C-reactive protein during the acute phase of the disease; when the latter was absent the blood picture was normal in 80% of the cases. A decrease in pancreatic excretory function during the acute phase was observed in 95.5%, and the decrease remained in 40% even 1 yr. after the disease. C-reactive protein in the acute phase was present in 61%, and at day 25 of the disease positive tests were found in only 9% of the patients. In the convalescents a slightly positive test was noted in 15% of the cases in the period of up to 6 mo. Immunologic reaction in the acute period was positive in only 44.4%, while in convalescence in the period of up to 6 mo. this percentage increased to 79.5%, i.e., it corresponded to normal. On the fifteenth-twentieth days of the disease (which had a cyclic course) 72.5% had a positive reaction to total autoantibodies; this gradually decreased and was present in 6.4-7.0% after 2-4 yr. In the cyclic course of hepatitis the total autoantibodies were measured in 42.4-36.6% after 3-12 mo. of convalescence. Pancreatic autoantibodies were found in 12.5%-14.4% of convalescents for periods of up to 2 yr.; after 3-5 yr. they were found in 4.7% of the cases. Such antibodies were absent in healthy children. Exacerbation occurred most frequently during the first 3 mo. after release, and its frequency did not exceed 4.6%. At release, residual symptoms were found in 50% of the cases; after 1 yr., they were found in 37.4%; after 2 and 3 yr., in 26%; after 4 yr. in 34% and after 5 yr. in 35.2% of the convalescents. A normalization of biochemical tests and improvement in general condition before release were found in 49.1%; after 1 yr. in 62.6%, after 2- and 3 yr. in 74.0%, after 4 yr. in 66.8% and after 5 yr. in 64.8% of the patients. There was no correlation between the severity of the disease and the course of convalescence, or between the type of therapy used in the acute period of hepatitis and further characteristics of the convalescent period. The necessity of systemic observation of convalescents for more than 6 mo. is emphasized.

7564 SOME PROBLEMS OF TUNGSTEN METABOLISM IN EPIDEMIC HEPATITIS. (Rus.) Dontsov, G. I. (Sverdlovsk Med. Inst., USSR). Sovet. Med. 29(12):14-17, 1966.

The tungsten content (determined by the photocolorimetric rhodanide method) in blood, urine and feces of healthy individuals living in or near Sverdlovsk was 9.28 μg%, 440.18 μg% and 341.13 μg%, resp. In 190 patients (17-60 yr. old) with viral hepatitis of light or mild form (Group 1, 49 patients), moderately severe (Group 2, 90 patients) and severe forms (Group 3, 51 patients), there was a relationship between tungsten content of blood, urine and feces, and the severity and phase of the disease. At the peak of the disease, the content of tungsten in blood for Groups 1-3 was 41.6-88.5 μg%, while at release (clinical cure) it was 20.0 μg% to normal values. During pronounced clinical symptoms the urine tungsten content was decreased, especially in Group 3 (119.4 μg%); at the start of improvement it increased (Groups 1-3, 262.4-243.1 μg%) and at clinical cure it was normalized. Normalization of tungsten content in blood and urine is explained by the action of steroids and glucocorticocoids. The tungsten content of feces at the peak of the disease in Groups 1-3 was decreased and varied between 134.5-64.1 μg%; however, in clinical cure it increased and reached 161.8-225.9 μg%. These low values are explained by an accumulation of tungsten in bones, liver and other parenchymal organs. In 19 convalescents bile mixed with duodenal content contained an av. of 10.8 μg% of tungsten; gallbladder bile contained 59.0 μg% and hepatic bile 16.4 μg%. Patients received up to 600 μg of tungsten daily with their food. In viscera of patients with viral hepatitis the tungsten content was 1.5-3.0 times higher than in those of healthy persons (who had died in accidents).

7565 24-HOUR VARIATIONS OF UROBILIN IN THE URINE OF CHILDREN WITH EPIDEMIC HEPATITIS. (Rus.) Efimova, S. P. (2nd Moscow Med. Inst.). Vop. Okhr. Materin. Dets. 11(11): 50-52, 1966.

Daily urinary excretion of urobilin was studied in 74 children (2-15 yr. old); studies were made in 43 during the course of viral hepatitis (of mild, moderately-severe and atypical forms), in 25 at periods of 1-12 mo. after the illness and in 14 children without liver pathology (7 healthy normals, 3 with scarlet fever, and 4 with respirat diseases). In healthy normals and in those with scarlet fever, the urobilin level was low, showin 1 or 2 peaks which did not exceed 2 mg%. In all children with viral hepatitis, minimum urobilin was 1 mg% and the max. level was 40-80 mg%. Fluctuations decreased and peaks were lower after the acute phase of the disease ended; however, in only 50% did the urobilin level normalize after clinical symptoms had disappeared. Urobilin level was independent of age, severity of the disease o other liver functions. The urobilin curve was normalized from 18-40 or more days after onset of the disease. Pathological urobilin curves were preserved for a long time in all patients with bile tract complications. The daily urinary urobilin excretion was normal in 16 of 26 patients observed for 1-12 mo. after the illness; they also showed no clinical or biochemical symptoms of hepatic lesions. Urobilin curves were pathologica in 5 patients observed after 1 or more yr.; all had bile tract lesions, but no biochemical shifts. In 3 patients, pathological urobilin curves were accompanied by biochemical shifts, characteristic of the acute period of disease. One patient, observed 2 yr. after a mild course of the disease, complained of decreased appetitie and periodic vomiting; biochemical indices of the blood did not show an acute process, but urobilin curves were pathologic (with fluctuations of up to 12 mg%). Puncture biopsy revealed portal fibrosis and microdrip adiposis of the hepatic epithelium. Thus, the daily urobilin flucturation, reflecting functional liver conditions, can be used in combination with clinical and biochemical data for solving the problem of diagnosis and prognosis in viral hepatitis.

7566 EPIDEMIOLOGY OF HEPATITIS. (Por.) Da Silva, A. M. J. Med. (Porto) 60(1228):863-866, 1966.

A statistical analysis of the incidence of virus hepatitis and hepatitis acquired by inoculation, in Angola Province, Portuguese Africa, is supplemented by a review of differential diagnosis and prophylaxis. The incidence of virus hepatitis in 1958, 1959 and 1960 was 2.0, 8.0 and 6.0 per 100,000, resp.; data for 1961 were not available; comparable tabulations for 1962, 1963, 1964 and 1965 were 7.5, 4.25, 4.0 and 6.5 per 100,000, resp. Approx. 55% of all cases of hepatitis, including both origins, occurred in individuals between 15 and 44 yr. of age; in the 8 yr. represented by the above tabulations, a total of 33,660 days were lost from work for this reason by 1122 persons in the age-range indicated. Viral hepatitis was encountered much more frequently

:hildren 5-15 yr. of age; hepatitis acquired
inoculation, in adults aged 20-44 yr. The
mortality rate for viral hepatitis was
ox. constant, at 2%; that for hepatitis
ired by inoculation fluctuated between 6-12%.

7 CHROMATOGRAPHIC STUDIES OF URINARY
AMINO ACIDS IN CHILDREN SUFFERING
VIRAL HEPATITIS. (It.) Frangini, V. (U.
ence, Italy), C. Moggi and G. Poggini. Riv.
. Pediat. 77(6):320-327, 1966.

ompared to 30 healthy children, (6-12 yr.
, chromatographic studies of 24-hr. urine
les derived from 13 children with viral
titis (5-12 yr. old) and having been ill for
ore than a wk., showed very markedly in-
sed urinary excretion of leucine, tyrosine,
ionine and tryptophan; less markedly, but
l significantly, increased excretion of
onine, proline and histidine. Variations in
excretion of lysine and phenylalanine were
at a level of statistical significance.
nine was found only rarely.

REPORT OF AN EPIDEMIC OF VIRAL
HEPATITIS IN A RURAL COMMUNITY. (It.)
li, G. (Bolognini Hosp., Bergamo, Italy),
ichera and I. Mantovani. Epatologia 12(4):
705, 1966.

21 cases of hepatitis with jaundice occurred
8 families in one small village, 69 of 72
diate relatives of the patients were also
ected to study. Both SGOT and SGPT levels
significantly above normal in 42 of 69
of 42, aged less than 30 yr.; 14 of 42,
30-50 yr.), all of whom had symptoms very
lar to those of patients with manifest
dice. In almost all the nonjaundiced patients,
SGOT:SGPT ratio was inverted and BSP reten-
and MacLagan's tests were positive. Although
obulin levels were abnormal, they were
as low as those found in jaundiced patients.
jority of patients in both groups had re-
red, with essentially normal laboratory
ings, by the end of a 4 mo. observation
od.

BLOOD COAGULATION STUDIES IN THE COURSE
OF HEPATITIS WITH JAUNDICE. (It.)
ani, E. (Civil Hosp., Monza, Italy) and
. Dinelli. Epatologia 12(4):726-731, 1966.

hrombodensity test" is described, consisting
hotometric assays of variations in opacity
h occur in plasma samples before and after
addition of thromboplastin. Among patients
only slight parenchymal liver damage due to
titis with jaundice, a slight increase of
optical density was found; among those with
re damage, a marked diminution of max.
cal density. A very marked increase of max.
ity appeared to be associated with hyper-
inogenemia in the presence of a tumor.

7570 CHRONIC, ACTIVE HEPATITIS. (It.)
Bertoni, L. (Hosp. Inst. Verona, Italy).
Epatologia 12(4):662-665, 1966.

In 2 men with chronic, recurrent hepatitis (43 and 47 yr. old, resp.) intensive, prolonged treatment with corticosteroids (no details) reduced temperature and transaminase levels and decreased asthenia, without being able to prevent periodic recurrence of active episodes. Both were put on combined therapy with 6-mercaptopurine (100 mg/day for 5 days; then 50 mg/day for 10 days; then 25 mg/day for 15 days), plus prednisone (30 mg/day for 30 days), repeated 6 times with 1 mo. rest between courses. Both showed progressive improvement throughout the treatment period, accompanied by total regression of purpura, hepato- and splenomegaly, and (in 1 of 2) rheumatic distress. Neither had experienced recurrence at the time of report (interval not indicated).

7571 SEQUELAE OF VIRAL HEPATITIS. (It.)
Grasso, E. (Civil Hosp. S. Croce,
Cuneo, Italy), G. F. Ferro and G. Vacca. Minerva
Med. 58(9):258-260, 1967.

Follow-up studies were made of 90 patients (14-65 yr. old) 6 mo. or more after complete recovery from viral hepatitis. Some hepatomegaly was found in 75%, discoloration of the tongue in 88%, subclinical jaundice of the sclera in 65%. There was no consistent relationship between such clinical findings, subjective complaints and/or laboratory findings, which were entirely normal in only 12 of 90 cases (13%). Serum cholesterol was reduced in 31% of the group; prothrombin levels in 28%. Serum alkaline phosphatase was increased in 26% and total serum bilirubin in 16%. SGOT was increased in 11%; SGPT, in 3.5%; BSP retention, in 5.5%. It is concluded that the frequency and severity of sequelae of viral hepatitis need further study.

7572 SERUM ENZYME PATTERNS IN VIRAL
HEPATITIS AS AN INDICATION OF THE
INTRACELLULAR SITE OF DAMAGE TO THE LIVER CELL.
(It.) Pagliaro, L. (U. Palermo, Italy).
Epatologia 12(4):652-659, 1966.

During the first 2 wk. of illness from viral hepatitis, serum levels of the anionic fraction of SGOT (SGOT$_1$), sorbitol dehydrogenase, SGPT and phosphohexoiso-isomerase, all enzymes which originate in the unstructured fraction of cytoplasm, increased much more rapidly than did those of glutamic dehydrogenase, ornithine carbamyl transferase, or the cationic fraction of SGOT (SGOT$_2$), which originate in the mitochondria. The peak serum activity of these "cytoplasmic" enzymes was also reached somewhat earlier than that of the mitochondrial enzymes, so that the latter continued to rise after the former had begun to fall. Similar phenomena were not observed in patients with hepatoma or cirrhosis of the liver. It is concluded that the initial liver-cell damage in viral hepatitis is done to the cytoplasm and probably extends to the mitochondria only because of the intervention of a secondary, nonspecific mechanism of action.

7573 ANTIHEPATIC ANTIBODIES IN VIRAL HEPATITIS. (It.) Grassi, B. (U. Pisa, Italy), C. Loni, F. Ambrogi, G. Bellucci and A. Salvetti. *Epatologia* 12(3):521-526, 1966.

In the serum of healthy controls, antiliver antibodies could be demonstrated in 2 of 7 cases. They were also demonstrable in the serum of 5 of 6 patients with rheumatoid arthritis and in 1 patient, each, with scleroderma and pulmonary silicosis. In all instances the agglutination titer ranged from 1:2-1:4. Among patients with acute viral hepatitis, antiliver antibodies were demonstrable in the serum of 11 of 14, with agglutination titers ranging from 1:4-1:64; in direct proportion to the degree of dysproteinemia especially in terms of increased gamma-globulins. Following emergence from the acute phase of the disorder, these titers fell progressively over a period of 1-4 mo., prior to complete disappearance of the antibodies. In the serum of another group of patients, tested 30-120 days after the acute phase of the illness was over, antiliver antibodies were found in 5 of 9 cases, with agglutination titers ranging from 1:2-1:8. It is suggested that they may be produced as a defense against the products of necrosis and/or tissue inflammation.

7574 PROPOSED METHOD FOR OBVIATING THE DANGER OF POST-TRANSFUSION VIRAL HEPATITIS. (It.) Genovese, E. (U. Milan, Italy) and Y. Nakamura. *Epatologia* 12(3):555-560, 1966.

When Xenaldial (an antiviral agent derived from diphenyl; no additional details), 100 µg/ml, was added to mouse hepatitis virus EHF-120 in suspension in physiologic saline, human serum and human whole blood, the infectious titer was reduced to zero within 48, 72 and 120-336 hr., resp. A review of the literature appeared to confirm that admin. of 25-50 mg during an infusion of 250-500 ml blood or plasma would entail no undesirable side effects. It is therefore suggested that this technic might be used as prophylaxis against the transmission of hepatitis virus.

7575 SERUM BILIRUBIN FRACTIONS IN VIRAL HEPATITIS. (It.) Monteverde, A. (Maggiore della Carità Hosp., Novara, Italy). *Epatologia* 12(3):561-572, 1966.

Among 96 patients with viral hepatitis, total serum bilirubin tended to decrease with the course of the disorder, with median values of 9.67 mg% (range, 2.2-23.3) during the first wk., 8.15 mg% (range, 0.8-25.6) during the second, 5.53 mg (range, 0.0-21.7) during the third, 4.8 mg% (range, 0.0-16.6) during the fourth. Comparable tabulations for total dire bilirubin were: 7.6 mg% (range, 1.9-19.7), 6.6 mg% (range, 0.0-19.0), 4.4 mg% (range, 0.0 21.4) and 3.6 mg% (range, 0.0-15.5), resp. Fo indirect bilirubin, they were: 2.05 mg% (rang 0.1-13.0), 1.7 mg% (range, 0.1-7.6), 1.05 mg% (range, 0.0-6.3) and 0.7 mg% (range, 0.0-3.6), resp. For alcohol-soluble direct bilirubin, t were: 3.5 mg% (range, 0.3-8.3), 2.2 mg% (rang 0.0-7.8), 1.2 mg% (range, 0.0-7.7) and 0.65 mg% (range, 0.0-5.9), resp. For precipitable direct bilirubin, they were: 4.1 mg% (range, 1.0-12.9), 4.3 mg% (range, 0.0-14.0), 3.15 mg% (range, 0.0-11.2) and 3.0 mg% (range, 0.0-9.6) resp. Mean values for precipitable direct bilirubin expressed as a percentage of total direct bilirubin were 54%, 63%, 70% and 82%, resp.

7576 COMPLETE STUDY OF THE NATURAL EVOLUT OF HEPATIC LESIONS IN HUMAN, ACUTE VIRAL HEPATITIS. (It.) Naccarato, R. (U. Padua, Italy), O. Fameli, L. Okolicsanyi, G. Previato and L. A. Scuro. *G. Mal. Infett.* 18(8):539-550, 1966.

Conventional and electron microscopic studies were made of liver biopsy specimens derived from 24 patients with acute viral hepatitis (duration of illness not in excess of 20 days) and 19 with the same disorder in a subacute phase (after more than 3 wk. of illness). In t first group lesions were characterized by a marked reduction of cellular glycogen content, accompanied by the presence of large amounts of agranular endoplasmic reticulum and a significant increase in the number of ribosomes which tended to be either free or grouped into small clumps. The later stage of the disorder was characterized by swelling of the mitochondr and the presence of much-increased amounts of granular endoplasmic reticulum, phenomena which appeared to be associated with degenerative and necrotic cellular processes representing the final stage of morphologic change induced by viral hepatitis in the human.

7577 AMINO AND UREA NITROGEN IN THE BLOOD OF CHILDREN SUFFERING FROM VIRAL HEPATITIS. (It.) Frangini, V. (U. Florence, Italy), C. Moggi and G. Poggini. *Riv. Clin. Pediat.* 77(6):328-333, 1966.

Among 13 children (5-13 yr. old) suffering from viral hepatitis, serum levels of urea ranged from 16.07-32.14 mg%, based on a formula for converting serum urea nitrogen (range = 8.0-15.0 mg%) to urea. The range of the amounts of nitrogen contained in serum amino acids was calculated as 3.9-6.8 mg%. Although the mean levels indicated did not deviate from the normal range at a level of statistical significance, an overall tendency toward slight hyperaminoacidemi

a concomitant, slight diminution of serum
els of urea indicated during the period of
ve illness.

WIDESPREAD SEARCH FOR THE ETIOLOGIC
AGENT RESPONSIBLE FOR HUMAN VIRAL
ATITIS. (It.) Babudieri, B. (U. Padua,
y), E. Fiaschi, R. Naccarato, L. A. Scuro,
Papa and F. Tangucci. G. Mal. Infett. 18(8):
-570, 1966.

electron microscopic study of liver biopsy
cimens derived from patients with viral
atitis showed dilatation of the canaliculi
the endoplasmic reticulum, occasional cytolysis
swelling of the mitochondria, accompanied
fragmentation of their cristae. A marked
rease in the number of ribosomes was also
erved, as was the fact that many of these
positioned abnormally. There was also a
ificant increase of cellular RNA. Semi-
sparent, virus-like particles, surrounded
a simple membrane and measuring approx. 200
diameter were found in the cytoplasm of
epithelial and histiocytic liver cells from
ents examined between 9 and 33 days after
t of illness. Gamma-globulin preparations
ved from human convalescent serum and
ugated with fluorescein histiocyanate showed
ually identical areas of fluorescence. In
tic biopsy sections, antiviral γ-globulin
ugated with ferritin yielded images suggesting
the particles in question were identical
the hepatitis virus. At the time of report,
first efforts were being made to culture a
line containing the particles in question.

INVOLVEMENT OF THE PANCREAS IN THE
COURSE OF VIRAL HEPATITIS: STUDY OF
NINE-HEXOPEPTIDASE ACTIVITY. (It.) Nuti, M.
Rome) and C. Prantera. Arch. Ital. Sci. Med.
. 47(9-10):221-226, 1966.

m arginine-hexopeptidase activity was in-
sed in 40 of 60 patients with viral hepatitis.
0 of 40, serum levels peaked between 20 and
(normal for adults = 14-18 U); in 30 of 40,
een 31 and 52 U. Barely discernible increases
evidenced during the acute phase of the
rder, with further increases taking place
ually during the 2-3 wk. following, prior to
ual, spontaneous normalization. Serum levels
xcess of 30 U were invariably associated
dyspeptic syndrome, epigastric pain radiating
he left shoulder, hypersalivation or other
toms of pancreatic involvement. There appeared
e no statistically significant relationship
een the activity of the enzyme under study
that of amylase. It is concluded that viral
atitis would appear to be only one aspect of
sorder which also involves the duodenum and
larger organs associated with it.

IMMUNOGLOBULINS AND INTERFERON RESPONSES
IN INFECTIOUS AND TRANSFUSION ASSOCIATED
HEPATITIS. (E.) LoGrippo. G. A. (Henry Ford
Hosp., Deteroit, Mich.), H. Hayashi and N.
Sharpless. Henry Ford Hosp. Med. Bull. 15(1):
57-63, 1967.

Twenty patients with hepatitis (11 infectious, 9 associated with blood transfusion) were observed during the acute jaundice stage, and 1 was studied for 18 mo. starting 1 yr. after acute onset of hepatitis. Serum immunoglobulin (Ig), (IgA, IgM, IgG) levels and leukocyte interferon responses were compared with total proteins, electrophoretic mobility of serum proteins, SGOT, and bilirubin levels (total/direct). No correlation was observed between values in the γ-zone from electrophoresis and IgG values by immunochemical analysis. β-Zone patterns showed no evidence that IgM or IgA were abnormally high. It is recommended that immunochemistry, rather than electrophoresis, be used to quantitate immunoglobulins. In both types of hepatitis all the immunoglobulins were elevated during the jaundice stage. IgA and IgG values varied, but IgM values were consistently elevated. During recovery IgM values returned to normal and IgG values increased above normal, although 2 patients showed elevated IgM values at 18 and 30 mo., resp. Twenty patients showed "good" leukocyte interferon response.

7581 FURTHER STUDIES ON HAEMAGGLUTINATING AGENTS OBTAINED FROM ACUTE HEPATITIS SERA. (E.) Nagylucskay, S. (Univ. Med. Sch., Budapest, Hungary) and J. Angyal. Acta Microbiol. Acad. Sci. Hung. 13(3):189-192, 1966.

Sera were obtained from acute-phase blood samples from 99 hepatitis patients in the first 5-day period after initial symptoms of the disease; in addition, sera were obtained from 5 healthy donors, and convalescent sera from 13 patients with clinical diagnosis of infectious hepatitis and from 5 with serum hepatitis. In the allantoic fluid of chick embryos inoculated with acute-phase sera of viral hepatitis patients, a hemagglutinating agent developed similar to that contained in the serum; this confirmed previous findings. The agent could be maintained through numerous serial passages without loss of titer. Hepatitis convalescent sera mostly inhibited the hemagglutinating agent obtained either from acute-phase sera or in allantoic fluids. The sera of 2 rabbits immunized with an infectious hepatitis and serum hepatitis agent, resp., revealed only homologous inhibition. Preliminary neutralization tests in ovo appeared to be consistent with results of the hemagglutination inhibition tests. The hemagglutinating agents were highly resistant to heat; after being heated to 100° C for 20 min., the agents (50 of 52 allantoic fluids) still agglutinated tanninized human RBC, and the same treatment never prevented them from being maintenable in serial egg passages. Since hepatitis convalescent-phase sera often inhibited the hemagglutinating agents and this inhibition seemed to distinguish infectious hepatitis from serum hepatitis, there may be a possible specific reaction of the organism against the hemagglutinating agents.

7582 A GAS CHROMATOGRAPHIC STUDY OF FREE AND ESTERIFIED FATTY ACIDS IN THE PLASMA OF PATIENTS WITH INFANTILE VIRAL HEPATITIS.

(It.) Genova, R. (U. Modena, Italy) and V. Galli. Minerva Pediat. 18(26):1417-1424, 1966.

In 7 children with viral hepatitis (2 boys, 5 girls; 3.5-11 yr. old), pre- and post-treatment gas chromatographic studies showed a significant increase of total nonesterified fatty acids in the plasma at the time of diagnosis, with a median value of 813 μEq/liter (range, 500-1370 μEq/liter), which had returned to normal by the end of treatment in 5 of 7 cases; had continued to increase markedly in 2 of 7 (to 1000 and 2000 μEq/liter, resp.) despite clinical recovery and normalization of serum transaminase levels. This increase of nonesterified fatty acids was accompanied by a sufficient diminution of esterified fatty acids to maintain the serum level of total fatty acids within the normal range. Prior to treatment, the ratio of total saturated to total unsaturated fatty acids in the plasma was 37.58:61.16; after treatment, it was 37.36:63.54. Comparable ratios for nonesterified saturated against unsaturated fatty acids were 28.04:67.28 and 32.34:70.02, resp. As concerned percentage relationships of the individual fatty acids, esterified or nonesterified, no statistically significant differences were found between pre- and post-treatment analyses, with mono- and polyunsaturates both elevated above normal values at both times, suggesting that the liver's ability to synthesize phospholipids was preserved during the illness. The total duration of illness, and of the observation period, was 30-40 days. Corticosteroids were admin. to only 2 children, who received prednisone, 2 mg/kg/day x 7, repeated after an interval of 4 days.

7583 HEPATITIS IN INFANTS.

(Cz.) Raska, B. (Inst. Pediat. UDL, Prague). Cesk. Pediat. 21(10):885-891, 1966.

Epidemic hepatitis in infants often exhibits symptoms typical for intrahepatic obstruction jaundice. As these symptoms can be induced by several etiologic factors, laboratory tests have only a limited value in the differential diagnosis of viral hepatitis in infants. The serum test based on the shift of the ratio of albumins to globulins is especially useless, because of the very low level of γ-globulins 3-5 mo. after birth. Repeated duodenal sounds with admin. of $MgSO_4$ are valuable from both the diagnostic and therapeutic point of view and often break the functional blockage of the bile. To distinguish between transient and anatomical occlusions in infants, it is often necessary to carry out bioptic examination followed by postoperation cholangiography. The risk of exploratory leparotomy, applied under suitable conditions a at appropriate time, is low.

7584 NEW INFORMATION CONCERNING THE FUNCTIONAL DIAGNOSIS OF HEPATITIS IN CHILDREN.

(Cz.) Stroder, J. (Univ. Clin., Wurzburg, Germany). Cesk. Pediat. 21(10):865-8 1966.

The increased level of some enzymes and of bili in serum are useful critera for diagnosis of hepatitis in children during the acute phase of the disease. However, already 2-3 wk. after th appearance of hepatitis symptoms the level of these enzymes and of bilirubin returns usually normal values. Thus these tests cannot be used during the later stages of hepatitis for the determination of the severity of the disease an of the extent to which the liver of the childre was damaged. It was found that the levels of prothrombin, Factor VII, Factor IX, and Factor in sera of children were markedly reduced durin the first 2 wk. after the appearance of hepatiti symptoms. The impaired clotting of the blood correlated with the increased bilirubin content of the serum during this time interval. Later, the level of clotting factors became normal. However, during the recovery, i.e. 8-20 wk. aft the appearance of hepatitis symptoms, about 60% of children again had significantly decreased levels of prothrombin and of Factor VII in thei sera, although other serum tests were negative at that time. By special care during the recove period the incidence of recurrence, as indicate by decreased levels of clotting factors, could b substantially reduced. The response of children to the admin. of vitamin K is very variable. It may cause both an increase, as well as a further decrease, of the levels of clotting factors in the serum.

7585 REPEATED ISOLATIONS OF PREVIOUSLY UNKNOWN ADENOVIRUSES FROM PATIENTS WITH VIRAL HEPATITIS BY MEANS OF HISTOLOGICAL METHODS.

(Ger.) Köhler, H. (Koch Inst., Berlin J. Apodaca and D. Springer. Zbl. Bakt. (Orig.) 202(1):11-26, 1967.

Sera of patients with viral hepatitis were obtai from hospitals; samples were taken from these subjects for the period of 1 yr. until the sera proved to be sterile. Sera of patients free of hepatitis and with no history of the disease served as controls. The blood was used on the d it was taken or when necessary was refrigerated until the next day. The isolation of hitherto unknown viral strains was done in primary cell cultures of the cortex of the healthy hog kidney according to the method of Von Lembke and his coworkers; 5, 10, and 50 cultures were inoculate with a test serum while other cultures were inoculated with the control serum. Ten days aft inoculation the cultures were examined under the microscope for definite nuclear changes due to virus. The main changes consisted of increased e of the whole cell, with no apparent change the cytoplasm, but a more or less thick ophilic clumping in the nucleus and displace- t of the nucleoli to the nuclear periphery; gle or multiple large round eosinophilic lusions were also present in the nucleus; se were specific changes resulting from ection by adenovirus. Sterile control sera roduced into primary cultures of hog renal tex furnished proof that foreign viruses were present in the kidney preparation or in the ture medium. Increased virus conc. were ained from the supernatant medium of infected tures. Immune serum was obtained from rabbits . daily for 10 days with 1 ml of culture ernatant followed by a single booster shot k. before taking blood. Antisera to human noviruses 1-31 were tested. Serum taken m a hepatitis patient 13 days after onset of ndice, kept frozen at -20° C retained viable us after 156 days. Altogether 288 serum ples from clinical hepatitis patients were mined and 162 adenovirus isolations made. mination of the sera of 103 persons with arently clinically healthy livers resulted in y 10 virus isolations. Repeated examinations 62 patients with viral hepatitis from the inning of jaundice for 200 days showed the lowing: virus was isolated 6 times from 2 ients, 5 times from 6 patients, 4 times from atient, 3 times from 11 patients, 2 times from patients, and 1 time only from 19 patients. ing the first 20 days after jaundice 69.5% cases yielded positive virus isolations; ing the period 91-200 days virus was demon- ated in only 28.9%. None of the 40 viruses lated showed any serologic similarity to the known human adenoviruses; in no instance was possible to demonstrate the presence of tralizing antibodies even with homologous a. Experiments currently in progress have onstrated at least 2 diverse serotypes among isolates. Viruses isolated from the same ent were always serologically identical.

5 EXPERIENCES WITH THE RAPID COLOR TEST
FOR THE DETERMINATION OF SERUM ENZYMES
FIELD EXAMINATIONS DURING A HEPATITIS EPIDEMIC.
.) Wagenknecht, C. (Humboldt U., Berlin,
nany) and G. Anders. Deutsch. Gesundh.
3):589-592, 1967.

most sensitive indicator of disturbed hepatic ular metabolism is the serum enzyme activity. simultaneous determination of 2 serum enzymes and LDH which in the course of a case of l hepatitis showed max. values at different s, is broad enough to establish an early nosis and also to differentiate the disease ng its course; the color tests for these mes have been described by the authors in ious papers. The advantages of these tests a minimum of apparatus, an improvised ratory, a minimum of untrained personnel are the requirements; 1 person can do a large er of tests in a short time. The tests are so designed that the greatest sensitivity occurs when the enzyme conc. is only slightly elevated; the tests were calibrated by a spectrophotometer and are especially suited to field work in epidemiology. Altogether almost 10,000 enzyme determinations were made on 2820 persons; those suspected of contact with cases of hepatitis were tested twice/wk. for 3 wk. Among 2820 persons tested, 116 had definite cases of hepatitis endemica. Five patients were in early stages of jaundice; 3 had both enzymes elevated, 1 had SGOT only elevared and 1 LDH only elevated; 25 patients in early anicteric stages had this distribution (all enzymes listed having elevated conc.): 15 both, 10 SGOT. Becoming jaundiced (78): 8 both, 2 SGOT, and 68 LDH. Cases not healed (4), 2 both and 2 SGOT. Four had chronic liver disease, 2 both and 2 LDH. Of the 116, 30 were both, 15 SGOT and 71 LDH. Of those tested, 4.1% had the disease and of these 83% were anicteric.

7587 GALLSTONE FORMATION AND VIRUS HEPATITIS.
(Ger.) Demling, L. (U. Erlangen,
Germany), K. J. Bahn, H. Geidel and I. Bahn.
Deutsch. Med. Wschr. 92(14):652-654, 1967.

A study was made on a total of 6080 patients, 3016 men and 3064 women; of these 2024, 1063 men and 971 women, had undergone cholecystography; 1014 patients, 608 men and 406 women had suffered from viral hepatitis. A possible connection between hepatitis and cholelithiasis was sought with the aid of the Chi^2-test. With the exception of 3 cases, the minimal interval between hepatitis and cholecystography was 6 mo.; the av. time between the 2 was 12.9 yr. for the women and 14.9 yr. for the men. The frequency of cholecystography among patients with hepatitis was greater than among those without the disease. No correlation was found between the incidence of gallstones in men and a previous hepatitis. When the null-hypothesis was applied to the women, the probability of error was 0.01%. (For the entire group, the probability of error was less than 0.01%). This implies a negative correlation, between hepatitis and gallstone formation, i.e., those who formerly had hepatitis had significantly less lithiasis than those without hepatitis. This applied to all age groups.

7588 IN SPECIES SPECIFIC RESISTANCE
ALTERABLE BY ETHIONINE? I. INFECTION
EXPERIMENTS IN RATS WITH DUCKLING HEPATITIS VIRUS.
(E.) Lomniczi, B. (Vet. Med. Res. Inst., Acad.
Sci., Budapest). Z. Immun. Allergieforsch.
132(4):335-344, 1967.

Experimental rats were placed in 2 groups: those who received a normal semisynthetic diet; those who received a semisynthetic diet + 0.4% ethionine. Four serial transfers of duck hepatitis virus ($10^{6.3}$ LD_{50}/ml; in embryonated eggs) were made in rats pre-treated and not pretreated with ethionine. There was no difference in clinical signs and mortality between the ethionine-treated infected group and the ethionine-treated non-infected group (ethionine control) in 4 passages. In the second passage there was a slight increase in the incidence of mild jaundice in the ethionine-infected group. Four rats in the ethionine-infected group (total 55) and 3 in the ethionine-control group (35) died between days 3 and 8 after inoculation of intercurrent disease regularly occurring in ethionine rats (pneumonia due to Corynebacterium pseudotuberculosis, strangulation ileus). Histologic study of livers of 46 ethionine-infected rats killed from 3-9 days after inoculation, showed loss of definition of parenchymal columns, fatty degeneration or necrotization of parenchymal cells, swelling or pyknosis of cellular nuclei, accumulation of histiocyte-type cells, occasional appearance of very conspicuous nuclei, and sometimes periportal hemorrhage. No disease was observed in the normal-infected group. Pretreatment of rats with ethionine inhibited experimental transmission of duck hepatitis virus. Virus did not multiply in the ethionine rats, but could be demonstrated as active residual virus for at least 9 days whether rats were pretreated or not. Elimination of virus was slower in ethionine rats than in normals. Livers of ethionine rats showed uniform microscopic damage irrespective of whether they were infected or not.

7589 METABOLIC ASPECTS OF THE EVOLUTION OF HEPATOCELLULAR LESIONS INDUCED BY MHV-3. (It.) Coltorti, M. (U. Naples, Italy), A. Di Simone, G. Budillon, A. M. Barbieri and C. Del Vecchio-Blanco. Epatologia 12(3):426-437, 1966.

Mice infected with MHV-3 hepatitis virus, inoculated i.p., showed no significant changes of absolute values for total hepatic lysosomal enzymatic activity at any time during an observation period of 48 hr. after inoculation. However, a very marked increase in the activity of all free lysosomal fractions was demonstrated by the third hr., continuing through hr. 48, with a further rise following the onset of severe liver damage about hr. 24. RNA synthesis, which was not affected during the earlier stages of infection, also increased markedly toward the end of the observation period. Significant increases of serum levels of acid phosphatase, β-glucuronidase, cathepsin, arylsulfatase and ribonuclease appeared after 24 hr., preceded by an initial rise of serum arylsulfatase activity after 12 hr. and of serum ribonuclease and acid phosphatase activities after 18.

7590 SPECTROPHOTOMETRIC INVESTIGATION OF THE BILIRUBIN FRACTIONS IN CHILDREN WITH INFECTIOUS HEPATITIS. (Rus.) Mar'ich, L. N. (Leningrad Sci. Res. Inst. Infect. Dis., USSR). Pediatriia 46(5):26-29, 1967.

7591 THE FUNCTIONAL STATE OF THE GASTRO-PANCREATIC SYSTEM IN CHILDREN WHO HAVE SUSTAINED INFECTIOUS HEPATITIS (BOTKIN'S DISEASE. Benderskaia, S. M. (Khar'kov Inst. Postgrad. Me USSR), I. D. Ass and Iu. V. Belousov. Pediatrii 46(5):32-35, 1967.

7592 THE DIFFERENTIAL DIAGNOSIS OF HEPATIT CAUSED BY TRANSFUSION. (Ger.)(Rev.) Krebs, H. J. (Cent. Inst. Blood Trans., Hamburg Germany) and P. Scharenberg. Munchen. Med. Wsc 109(22):1234-1236, 1967.

7593 FUNDAMENTALS OF ETIOLOGY AND EPIDEMI OF INFECTIOUS HEPATITIS. (Ger.) Sp K. (Humboldt U., Berlin). Z. Ges. Hyg. 13(2):1 131, 1967.

7594 SERUM GLYCOPROTEIN PATTERN IN VIRAL HEPATITIS. (Pol.) Bryta, R. (City Hosp., Poznan, Poland). Pol. Arch. Med. Wewnet 38(4):403-408, 1967.

7595 VIRAL HEPATITIS. A STAFF HAZARD IN DIALYSIS UNITS. (E.) Jones, P. O. (Sefton Gen. Hosp., Liverpool, England), H. J. Goldsmith, F. K. Wright, C. Roberts and D. C. Watson. Lancet 1(7494):835-840, 1967.

7596 ETIOLOGY OF "VIRAL" EPIDEMIC HEPATIT (It.)(Rev.) Coppo, M. (U. Modena, Italy) and M. T. Agnolucci. Minerva Med. 58(33 1493-1496, 1967.

7597 THE RELATIONSHIP BETWEEN CLINICAL AN LABORATORY FINDINGS IN INFECTIOUS HEPATITIS IN THE WEST OF SCOTLAND. (E.) Reid, (Ruchill Hosp., Glasgow, Scotland). Scot. Med. 12(5):191-195, 1967.

7598 THE EFFICACY OF HEALTH-RESORT TREATM IN ESSENTUKI AT EARLY PERIODS FOLLOW EPIDEMIC HEPATITIS (BOTKIN'S DISEASE). (Rus.) Krashenitsa, G. M. (Piatigorsk Inst. Balneother and Physiother., USSR) and Iu. S. Vishnevskaia. Vop. Kurort. Fizioter. 32(2):151-155, 1967.

7599 ENZYMOLOGIC DIAGNOSIS OF EPIDEMIC HEPATITIS (EH). (Pol.) Boron, P. (Infect. Dis. Clin., Bialystok, Poland). Przegl Epidem. 20(2):129-135, 1966.

7600 A TRIAL OF EVALUATION OF THE ENZYMOLO SEROHEPATIC INDEX FOR DIFFERENTIAL DIAGNOSIS OF EPIDEMIC HEPATITIS (EH). (Pol.) Boron, P. (Infect. Dis. Clin., Bialystok, Poland and A. Rudkowski. Przegl. Epidem. 20(2):137-141 1966.

THE ASSESSMENT OF BIOCHEMICAL AND
ISOTOPE METHODS OF INVESTIGATION IN
ENTS WHO HAVE SUSTAINED INFECTIOUS HEPATITIS.
.) Startseva, E. K. (Irkutsk Med. Inst.,
) and S. A. Makarenko. Med. Radiol. (Moskva)
:58-61, 1967.

VALUE OF TREATMENT WITH A NON-ALKYLATED
STEROID ANABOLIZING DRUG IN CHRONIC
-VIRAL HEPATITIS. (E.) Mărcuş, N. and C.
trescu. Rev. Roum. Med. Intern. 4(1):69-74,
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PEROXIDASE AND CYTOCHROME OXIDASE OF
LEUKOCYTES IN CHILDREN WITH INFECTIOUS
TITIS. (Rus.) Iunusova, Kh. A. (Tashkent
Inst., USSR) and V. G. Bolobonkin. Med. Zh.
. (2):21-23, 1967.

7604 RELATIONSHIP BETWEEN LABORATORY INDICES IN CHILDREN WITH INFECTIOUS HEPATITIS. (Rus.) Shamsutdinova, A. G. (Tashkent Med. Inst., USSR). Med. Zh. Uzbek. (2):23-24, 1967.

7605 THE BEHAVIOR OF THE BROMSULPHTHALEIN TEST IN A GROUP OF PATIENTS WITH VIRUS HEPATITIS, TREATED WITH AN ASSOCIATION OF SOME AMINO ACIDS, NICOTINAMIDE, FOLIC ACID AND VITAMIN B_{12}. (It.) Rizzo, F. (Civil Hosp., Genoa, Italy). Minerva Med. 58(Suppl. 34):1603-1605, 1967.

7606 SO-CALLED CUTANEOUS PORPHYRIA OF THE ADULT SUBJECT DISCLOSED IN A CHILD BY VIRAL HEPATITIS. TREATMENT WITH ADENOSINE-5-MONOPHOSPHORIC ACID. (Fr.) Gajdos, A. (Hotel-Dieu, Paris), B. Plainfossé and P. Seringe. Presse Med. 75(11):545-547, 1967.

7607 ENZYMATIC ACTIVITY AND SWELLING IN SUSPENSIONS OF RAT LIVER MITOCHONDRIA BEFORE AND AFTER INCUBATION IN VITRO. (It.) Migneco, G. (U. Palermo, Italy), F. Giglio, S. Le Moli, L. Pagliaro and A. Notarbartolo. Fegato 12(3):341-351, 1966.

Homogenates were prepared from the livers of female Sprague-Dawley rats approx. 4 mo. old, previously fed a standard diet and weighing approx. 150 g. Prior to homogenization some of the livers were incubated for 3 hr. at 38°C in 10 ml CO_2-saturated Krebs-Ringer phosphate soln. containing 0.1% glucose. In all instances such incubation increased succinic dehydrogenase activity significantly, decreased ornithine carbamyl transferase activity significantly, induced a significant loss of soluble protein (as indicated by the ratio of glutamic dehydrogenase activity in mitochondrial protein to that found in supernatant protein) and decreased mitochondrial swelling progressively, as the pH of the incubation soln. was increased. Inasmuch as identical patterns of change were elicited in a previous study using homogenates of normal and cirrhotic human livers, it is concluded that the mitochondrial changes seen in cirrhotic human livers may be due to similar deprivation of O_2 and substrates.

7608 HEPATOPEXY USING TISSUE ADHESIVES AS A COMPLEMENTARY PROCEDURE TO END-TO-SIDE PORTACAVAL ANASTOMOSIS IN THE TREATMENT OF ASCITES (IMMEDIATE AND LONG-TERM RESULTS IN 33 OPERATED CASES). (Fr.) Belli, L. and D. Forti. J. Chir. (Paris) 92(6):589-606, 1966.

Hepatopexy using Eastman 910 acrylic adhesive was performed in 33 patients with cirrhosis and ascites; 31 also underwent end-to-side portacaval shunts. Esophageal varices were present in 20 cases and hemorrhage in 10. Nearly all of the 21 patients presenting with massive ascites also showed severe protein depletion, electrolyte imbalance, and liver function disturbances, and proved relatively resistant to other treatment; the other 12 patients had moderate, episodic ascites, with less profound liver function disturbances in 8 cases. The adhesive was applied to the entire surface of the liver at operation; subhepatic drainage was sometimes performed in the immediate postoperative period. Two patients (7% of the group) died of hemorrhage after 7-14 days; both had marked ascites and had proved refractory to diuretics. The other 31 patients were discharged in good condition 20-35 days postoperatively. A slight recurrence of ascites was noted in 3 patients (all initially presenting with massive ascites) after 10-15 days; all responded promptly to diuretics and transfusions. All 8 evaluable patients initially presenting with moderate ascites were alive without recurrence after 1-3 yr. In the 15 evaluable patients initially presenting with massive ascites, the mortality rate after 1 and 2 yr., was 15% and 30%, resp. None of these patients died of recurrent ascite the 2 deaths in the first 12 mo. were due to hepatic coma with jaundice, while the 4 deaths in the second yr. resulted from stomach cancer (1), hemorrhage from ruptured esophageal varice (1), hepatic coma (1) or undetermined causes (1 At the time of report, 9 of these patients were alive (6 after over 3 yr.); only 2 had presente recurrent ascites, easily controlled by diureti and protein replacement therapy. The general condition was good in all cases, although sever showed serious liver function disturbances and patients in this group had episodes of "porto-systemic" encephalopathy with edema.

7609 HEPATIC VASCULAR CHANGES IN HUMAN AND EXPERIMENTAL CIRRHOSIS. (E.) Mitra, S. K. (Roy. Free Hosp., London). J. Path. Bac 92(2):405-414, 1966.

Cirrhosis was induced in 60 rats by s.c. inj. o CCl_4 (0.1 ml/100 g body wt.) twice weekly for 18-56 wk. (54 survived). Biliary obstruction w induced by ligation and division of the common bile duct in 30 rats (13 survived). Cirrhotic (35) and obstructed livers (13) were inj. with India ink and 3% carmine-1% gelatin through different vessels; 2 vascular compartments were i at a time and fluids were introduced simultaneously. Livers were removed after ligation of vessels and fixed in 4% formaldehyde in sali for 3 days. At autopsy 5 human cirrhotic liver were removed and similarly inj. Vinylite-corro casts were made. Cirrhotic rats had all 3 possible types of shunts: hepatic artery-portal vein; portal vein-hepatic vein; hepatic artery-hepatic vein. Human livers had the first 2. Arterio-portal shunts exist in normal liver and dilate in cirrhosis due to arterial enlargement Other types possibly develop from persisting sinusoids in the fibrous septa. Livers obstructed for 6 wk. had no pathological shunts. Shunts may develop only after very prolonged obstruction, with onset of true nodular cirrhosis Hepatic, and also portal, veins in human livers were reduced in number and flattened and distor by regenerating nodules. Both venous trees wer similarly distorted in rats. Regenerating nodu were mainly supplied by portal venous branches, only rarely by arterial twigs, and their blood supply was less than that of normal parenchyma. Hepatic arteries were enlarged and increased in number in human livers. In the fibrous septa there were rich arterial plexuses which supply proliferated bile ducts and connective tissue. Such plexuses were also prominent in rats, seen mainly around the proliferated bile ducts, as the septa were not so broad.

7610 PORTAL BLOOD FLOW IN CIRRHOSIS OF THE LIVER. (E.) Moreno, A. H. (Lenox Hill Hosp., New York City), A. R. Burchell,

. Rousselot, W. F. Panke, S. F. Slafsky and
. Burke. J. Clin. Invest. 46(3):436-445, 1967.

ct measurements of flow and pressure and
(116) in the portal vein of 85 patients
cirrhosis (30 with associated ascites) showed
rked reduction in flow associated with an
st constant plateau of portal pressure. Lack
orrelation indicated the complex relation-
s of resistances in the splanchnic, collateral,
hepatic circuits determining the division of
available splanchnic flow between the portal
and collateral pathways. Subtraction of
ured portal flow from accepted estimates of
l hepatic blood flow in cirrhosis suggested
the hepatic artery contributes more than
of the blood passing through the cirrhotic
r. No retrograde portal flow was observed
ng preshunt measurements, but this was common
r side-to-side portacaval anastomosis. To
ain the plateau of portal pressure in con-
tion with increased outflow resistance pre-
bly associated with progress of disease, it
suggested that splanchnic flow in cirrhosis
educed by an augmented inflow resistance to
splanchnic chamber. End-to-end portacaval
tomosis reduced pressure to acceptable con-
levels, but did not return normal portal
. It is suggested that most of the splanchnic
d was flowing through the shunt and that this
to a high splanchnic resistance immediately
r the shunt. If this resistance was pre-
sly elevated, as is suggested by the portal
sure plateau, the mechanism responsible for
elevation was not stopped immediately after
shunt, and the true effect of the operation
planchnic flow may not be measurable at this
. Respiratory oscillations were a significant
onent of the portal flow in cirrhosis before
after portacaval anastomosis, limiting steady
e analysis of the circulatory derangement
rrhosis.

A STUDY OF SERUM ALKALINE RIBONUCLEASE
ACTIVITY IN THE COURSE OF CIRRHOSIS
HE LIVER. (It.) Doniselli, M. G. (U. Milan,
). Settimana Med. 54(11):591-594, 1966.

alkaline ribonuclease activity (expressed
he mean percentage of depolymerized ribo-
eic acid) was determined for 16 normal con-
, 31 patients with cirrhosis of the liver
without hepatic coma, 9 patients with cir-
s and hepatic coma (fatal in 4 of 9) and
cirrhotic groups combined, as follows:
, 31.3%, 31.9% and 31.4%, resp. It is
uded that serum alkaline ribonuclease
ity is increased in patients with cirrhosis
he liver, at a level of statistical sig-
cance, but that the degree of increase does
ppear to be correlated with the duration
llness, the degree of severity, the extent
undice, hepatomegaly, atrophy, alcoholism
revious hepatitis.

7612 TREATMENT OF PRIMARY BILIARY CIRRHOSIS WITH AZATHIOPRINE. (E.) Fischer, J. A. (Med. U., Zurich, Switzerland) and M. Schmid. Lancet 1(7487):421-424, 1967.

A 46-yr.-old woman with microscopically confirmed primary biliary cirrhosis with a focal distribution and without jaundice showed remission after treatment with azathioprine. At the time of initial diagnosis, a high level of nonspecific mitochondrial antibodies was noted along with a complement fixation titer in excess of 1/256. No antinuclear factors were detected. Upon readmission 1 mo. later treatment with azathioprine (100-200 mg/daily) was started, resulting in a marked decrease in liver size, reduction in splenomegaly, lowered serum alkaline phosphatase (to 21.0 Bodansky U) and elevation in serum bilirubin. The drug was discontinued after adverse hematologic effects and the liver again increased in size. Following recovery of RBC and WBC levels, treatment was resumed (50 mg/day) resulting in eventual wt. gain, disappearance in pruritis and less hepatic infiltration as shown by small-needle biopsy. In a 52-yr.-old male with frank cirrhosis, marked jaundice and severe pruritis, treatment with azathioprine (300 mg/day for 11 days and then 200 mg/day for approx. 5-6 mo.) reduced the pruritis and the patient manifested some subjective improvement. The liver size did not show any reduction during treatment and the spleen remained palpable. Slight periorbital xanthelasma remained unchanged. There was a decrease in both serum alkaline phosphatase and bilirubin levels. Increased application of azathioprine in the treatment of primary biliary cirrhosis is recommended.

7613 ARTICULAR MANIFESTATIONS OF PRIMARY BILIARY CIRRHOSIS. (Fr.) Hawthorn, E. and M. Magnan. Marseille Med. 104(2):125-133, 1967.

Two cases of "biliary rheumatism" are presented in whom inflammatory arthropathies appeared 2 yr. (1st case) and simultaneously (2nd case) with the symptoms of primary biliary cirrhosis. These rheumatic symptoms differ from those of chronic rheumatism in that they are less severe (responding well to treatment with aspirin), less evident physically, nonsymmetrical in occurrence, and have a more irregular evolution. In the first case, the arthropathy of the knee and shoulders responded to 4 g/day of aspirin until the patient returned 2 yr. later with complaints of abdominal pain, and diarrhea. Jaundice was evident. The rheumatism had developed further, affecting the finger joints (Hippocratic fingers) and spinal cord. Hepatic biopsy led to the diagnosis of Waldenstrom's disease and the patient was treated with 30 mg of delta-cortisone and 1 g of Penimepicycline each day. Improvement was rapid but 2 mo. later primary biliary cirrhosis was frankly evident. Arginine and vitamin D were added to the treatment. With the second patient the primary biliary cirrhosis was evident along with the transient arthralgia and minor decalcification. Movement of the wrists was painful and this patient also presented Hippocratic fingers. Treatment included 30 mg of delta-cortisone and 1 g of chlortetracycline. In conclusion, it is recommended that a biliary rheumatism be considered in patients who present with inflammatory arthralgias and Hippocratic fingers.

7614 STUDY OF THE URINARY ELIMINATION OF POTASSIUM AND SODIUM IN THE CIRRHOTIC WITH ASCITES.

(Fr.) Vivien, P. (Ther. Clin., Rennes, France), J. Gastard, J. Loussouarn, P. Saint-Drenant and P. Cousin. Therapie 22(1):177-189, 1967.

Determinations made from 30 cases of alcoholic cirrhosis demonstrated that the K/Na ratio in the urine is higher with ascitic cirrhosis than that found normally (control av. ratio was 0.36). The K/Na ratio was between 1 and 15 for 23 patients, with ratios between 1 and 4 for 16 of the 23; in only 3 of the 30 cases was the ratio less than 0.5. In total, 10 died; the percentage of deaths increased as the ratio increased. This held true in both the untreated as well as the 20 patients treated with diuretics (either spironolactones or Triamterene) or the 12 who received 30-40 mg of delta-cortisone. Of 12 patients who received 400 mg of aldactone alone and the 5 who received this in association with corticosteroids, 7 died. The K/Na ratio served as an indicator of the treatment efficacy; the successful cases were those wherein the ratio decreased to 0.5-0.8 with a progressive wt. loss. The corticosteroid served to lower this ratio more and lessened the post-therapeutic rebound. Of those who received only corticosteroids, half showed definite or temporary relief. The success of punctures was questionable. Even though an increase in K/Na ratio is not specific for cirrhosis but indicates rather, a defense mechanism against a loss of plasma, it serves well both in prognosis and evaluation of diuretic treatment with cirrhosis.

7615 EFFECTS OF OCTANOIC ACID ON SERUM-LEVELS OF FREE FATTY ACIDS, INSULIN, AND GLUCOSE IN PATIENTS WITH CIRRHOSIS AND IN HEALTHY VOLUNTEERS.

(E.) Linscheer, W. G. (Tufts U. Sch. Med., Boston, Mass.), D. Slone and T. C. Chalmers. Lancet 1(7490):593-597, 1967.

The effects of intraduodenal infusions of glucose and octanoic acid on the serum levels of glucose, insulin and free fatty acids were determined in 4 healthy male volunteers (20-35 yr. old) and in 5 patients (4 male, 1 female; 44-67 yr. old) with cirrhosis. Two glucose infusions were given to all subjects, and octanoic acid was added to 1 of 2 infusions in random order; octanoic acid alone was infused in 2 cirrhotics. Both test soln. contained glucose (138.9 mg/ml), sodium taurocholate (20 mg/ml) and NaCl (8.5 mg/ml) in
water; 1 soln. also contained octanoic acid
(10 mg/ml). Serum glucose, octanoic acid, insu
and total free fatty acids were determined befo
during and after infusion. Serum insulin level
rose in both groups during glucose infusions, b
the rise was significantly greater when octanoi
acid was added; this effect did not appear to b
mediated by the serum glucose because addition
of octanoic acid did not affect this level.
Serum free fatty acids fell in both groups but
inclusion of octanoic acid had no effect on the
rate of fall of serum free fatty acids. In bot
groups there were no measurable levels of octan
acid detected during glucose infusion alone, bu
measurable levels of the latter agent were dete
able within 10 min. of infusion when it was add
to the glucose infusion. After discontinuation
of infusion, a return to fasting levels of octa
acid was delayed as compared to the volunteers.
In 2 cirrhotic patients infused with octanoic
acid alone, no change in glucose or insulin con
was detected throughout the infusion; serum
octanoic acid levels were observed that were
identical with those of cirrhotics given an infusion containing octanoic acid and glucose.
Cirrhotics showed significantly higher levels
of serum insulin, glucose and free fatty acids;
however, the 2 groups were not age-matched and
conclusions were made, since glucose tolerance
decreases in older age groups.

7616 SOME ASPECTS OF CATECHOLAMINE METABO IN CIRRHOSIS OF THE LIVER.

(It.) Bannò, S. (U. Pavia, Italy) and A. Buzzetti.
Policlinico [Med.] 73(6):376-386, 1966.

Following a review of divergent experimental ar
clinical reports concerning serum and urinary
conc. of catecholamines in the presence of cirrhosis of the liver, a report is made of a stuc
of the 24-hr. urinary excretion of epinephrine
norepinephrine and vanilmandelic acid in 14
decompensated cirrhotic patients, all with asc
and all with diagnosis verified by biopsy. Nor
was receiving therapy which could influence the
results of the study and all were on diets free
of alcohol, tea, coffee and sweets. As compare
with 12 normal subjects of similar age, receiv
the same type of diet and receiving no medicat
of any kind during the observation period, no
statistically significant differences were four
It is suggested that compensatory mechanisms o
degradation, especially those involving ortho-
methylation and subsequent conjugation, may be
able to compensate even a markedly diminished
ability of the liver to metabolize these substances.

7617 CHANGES OF IMMUNITY IN PATIENTS WITH CIRRHOSIS OF THE LIVER, BEFORE AND AFTER TREATMENT WITH TESTOSTERONE PROPIONATE.

(It.) Cicchini, T. (U. Rome), M. Cao-Pinna an
G. Giannini. G. Mal. Infett. 18(1):43-47, 196

When blood derived from 16 patients with cirrh

ne liver (11 men, 5 women; 42-68 yr. old)
tested against *Staphylococcus aureus* before
after 60 days of treatment with testosterone
ionate, the mean phagocytic index rose from
-1.02 (ranges, 0.60-1.10 and 0.75-1.20,
), the mean opsonic index rose from 0.52-
(ranges, 0.30-0.69 and 0.55-0.80, resp.),
the mean number of colonies of *S. aureus*
loped per cm^2 on agar fell from 388-327
ges, 210-510 and 188-415, resp.), with in-
dual differences ranging from -95 to -22
n, -59). It is concluded that treatment
rrhosis of the liver with testosterone
onate resulted in significant improvement of
body defenses and natural immunity against
erial invasion.

THE ANTIGLOBULIN TEST WITH TANNED RED
CELLS IN PATIENTS WITH CIRRHOSIS OF
LIVER. (E.) Hoenig, V. (Charles U., Prague)
J. Hoenigová. *Z. Immun. Allergieforsch.*
3):233-239, 1967.

ed human RBC, treated with sera from 16
ents with hepatic cirrhosis and sera from
ormal patients, were exposed to antiglobulin
n or to antiserum to non-γ-globulin. Agglu-
tion was similar in the normal and cirrhotic
with the total antiglobulin serum. With
anti-non-γ-globulin serum, agglutination was
pronounced in the cirrhotic group. This
that serum globulins from both groups are
to tanned RBC and that binding of serum
γ-globulin is more pronounced with sera of
hotic patients than with normal sera. It is
ested that the activity of a factor inhibiting
binding of serum non-γ-globulin to tanned RBC
educed in cirrhotic sera as compared with
al. It is believed that these results have a
icochemical, rather than an immunological, basis.

SERUM 5-RIBONUCLEOTIDE PHOSPHOHYDROLASE
ACTIVITY IN LIVER CIRRHOSIS. (E.)
i, G. C. (U. Milan, Italy), A. Rezzonico and
ervasini. *Enzym. Biol. Clin.* (*Basel*) 8(1):
, 1967.

serum levels of activity of 5-ribonucleotide
hohydrolase had been found in patients with
ases of the hepatobiliary tract, including
ic cirrhosis, although levels were normal
hepatic coma. Enzyme levels in early hepatic
osis (11 patients), advanced cirrhosis (18)
epatic coma (6) were studied. There were
rmals. Diagnosis of cirrhosis was con-
ed by needle biopsy and liver function tests.
alkaline phosphatase was inhibited by
enediamine tetraacetic acid. Mean levels of
e activity were 0.43 in normals; 1.79 with
cirrhosis; 1.09 with advanced cirrhosis;
with hepatic coma. The reduction in levels
vanced cirrhosis and hepatic coma may be
o failure of synthesis within the liver,
occurs in advanced stages of cirrhosis.
was a significant correlation between re-
on of enzyme activity and low levels of
albumin, but no correlation with changes
rothrombin, cholinesterase, α_2-globulins, or
alkaline phosphatase. Reduction in enzymatic activity may be related to low conc. of substrates of the ATP system. Since this enzyme is localized in nuclei and the microsomes, the results may indicate damage to these organelles in hepatic cirrhosis and hepatic coma.

7620 HEMODYNAMICS IN THE CIRRHOTIC PATIENT DURING PARACENTESIS. (E.) Knauer, C. M. (Santa Clara County Hosp. & Med. Ctr., San Jose, Calif.) and H. M. Lowe. *New Eng. J. Med.* 276(9):491-496, 1967.

The effect of measured paracentesis upon hepatic vein wedge pressure, inferior vena cava pressure, i.p. pressure and cardiac output was investigated in 10 patients (5 male and 5 female) with liver cirrhosis and tense ascites. Observations included liver function tests, measurement of serum electrolytes, blood vol. determinations using ^{51}Cr-tagged RBC, ascitic vol. measurements by the BSP dilution technic. Cardiac output increased significantly (115-117% of control value) following removal of 250 ml of fluid and was maintained through 1000 ml. A trend to lowered cardiac output was observed in 7 patients who had more than 1000 ml withdrawn. Two of the 3 patients with ascitic vol. representing 20-25% of total body wt. showed an initial increase in cardiac output, only after removal of 1000 ml of fluid. Increased stroke vol. (115-119%) paralleled changes in cardiac output, and both are probably the result of increased venous return. Increase in peripheral resistance was observed early in paracentesis and remained uniform through removal of 1000 ml of fluid. Decompression resulted in a progressive and fairly uniform decrease in intra-abdominal pressure to 83% of base level after removal of 1000 ml of fluid. Such a decrease is thought to relieve obstruction of the inferior vena cava at the diaphragm. Five of 8 patients showed lowered hepatic wedge pressure (78% at 100 ml; 66% at 750-1000 ml) during paracentesis while the remaining 3 patients showed increased pressures which paralleled changes in cardiac output and were associated with only a 5% decrease in intra-abdominal pressure. Absolute vena cava pressures (8-17.5 mm) correlated with individual ascitic fluid vol. and abdominal tenseness.

7621 THE VALUE OF LYMPHOGRAPHY IN THE PORTAL HYPERTENSION OF LIVER CIRRHOSIS. (Ger.) Schreiber, H. W. (Marien Hosp., Hamburg, Germany), W. Koch and K. Diederich. *Langenbeck. Arch. Klin. Chir.* 317(2):124-139, 1967.

Lymphograms were obtained from those with healthy livers and those with liver cirrhosis, some having portal hypertension with and without ascites, before and after portacaval anastomoses, in order to gain information about (1) possible untoward side reactions of the technic; (2) the filling and form of the thoracic duct; (3) the filling and form of the retroperitoneal lymph vessels; and (4) the comparison of lymphographic and clinical findings. A 7 ml vol. of contrast medium made visible with 11% aqueous patent-blue soln. was pumped into the lymph vessels of the dorsal surfaces of both feet. The filling of the thoracic duct with contrast medium took place after the inj. as shown on X-ray films taken 6-24 hr. later. With proper timing and the control of X-ray intensity the delayed filling phases were recorded. The complete lymphographic record of a patient required 3 days including ancillary data comprising: (1) blood pressure, (2) electrocardiogram, (3) vital capacity, (4) sedimentation rate, (5) differential blood cell counts, (6) liver and kidney function tests. Subjective and objective disturbances were not encountered during the taking of lymphograms. In patients with portal hypertension the enlargement of the thoracic duct was a facultative symptom and result of an increased vol. and compensating flow of intra- and extrahepatic lymph. In patients with liver cirrhosis and ascites, a deficient flow of lymph in the thoracic duct was observed. From such observations and agreement between lymphographic and clinical findings, new therapeutic technics such as the cannulation and broad anastomosis of the thoracic duct with the subclavian and jugular veins, or the vena cava become possible for the prevention of hemorrhage from varices.

7622 THROMBOCYTOPENIA AND LIVER CIRRHOSIS. (Ger.) Frick, W. (Neumunster Hosp., Germany). Schweiz. Med. Wschr. 97(13):407-413, 1967

In a group of 130 cases of liver cirrhosis of different etiologies, an effort was made to correlate (1) thrombocyte count (more than 150,000/m^3 in 54 cases, 41.53%; between 100,000 and 150,000 in 14 patients, 10.77%; and less than 100,000 in 62, 47.70%; 58.47% with thrombopenia, all with less than 150,000/m^3) with other factors; (2) determination of total serum cholesterol and cholesterol esters, (3) serum bilirubin, (4) paper electrophoresis, (5) Takata reaction, (6) thymol turbidity test, (7) Weltmann coagulation band, (8) serum alkaline phosphatase, (9) serum levels of transaminases, (10) serum iron conc., (11) BSP test, (12) thromboplastin time, (13) bilirubin, urobilinogen and urobilin in urine, and urinary galactose test in some, (14) determination of size of spleen (chiefly by palpation and percussion) in some cases by X-ray. Diagnosis of liver cirrhosis was on the basis of laboratory tests and in 33 cases by biopsy. Unfortunately, although thrombocyte counts were made in 130 cases, measurement of the spleen was done in only 36 cases, WBC (not listed as a test parameter) in 15, and hemoglobin conc. (also not listed) in 58 cases. Some factors such as 24 hr. urinary excretion of estrogen in 8 cases, not mentioned elsewhere, are compared to the thrombocyte counts. A graph in the results shows the thrombocyte count plotted against the size of the spleen, expressed in g, of 33 autopsy cases not mentioned elsewhere. No relationship was found between platelet count and size of the spleen. The pathogenesis of thrombocytopenia in liver cirrhosis is obscure. The present findings rule out the existence of a hypersple
syndrome. The correlation between specific li
function tests and platelet count lead to the conclusion that liver damage is the primary ca
of thrombocytopenia. A disorder of maturation in the thrombopoietic system is unlikely; rath
it is felt that under the influence of the dam
liver the platelets are either formed abnormal
or damaged in the periphery. Relationships we
found between prothrombin time, BSP retention, serum albumins, and platelet count: the more pathologic the tests, the lower the platelet count. It is assumed that liver damage is the cause of the thrombocytopenia. As has been seen from the relationship between the individ
function tests and platelet count, the latter tends to fall as liver damage increases. Plat
count may, therefore, be used as a criterion for the evaluation of the severity of liver ci
rhosis.

7623 THE DIAGNOSTIC VALUE OF THE ELECTROENCEPHALOGRAM IN HEPATOPORTAL ENCEPHALOPATHY. A COMBINED CLINICAL AND STATISTICAL CONTRIBUTION TO THE PROBLEM OF NEUROLOGIC AND PSYCHOLOGIC CHANGES IN LIVER CIRRHOSIS AND PORTACAVAL ANASTOMOSIS. (Ger.) Penin, H. (Friedrich Wilhelm U., Bonn, Germany). Fortsc
Neurol. Psychiat. 35(4):173-234, 1967.

The diagnostic value of the electroencephalogr
(EEG) in the practical determination of hepatoportal encephalopathy is assayed in this paper on the basis of an exhaustive study of 256 patients with chronic liver cirrhosis and general
portal hypertension. Included is a history of the psychiatric study of encephalopathies cause
by portosystemic shunts, and the recent use (i
the last 20 yr.) of the EEG in this field. Th
possible physiologic and chemical causes of the
encephalopathies, their clinical symptomatolog
and neuropathology are considered as well as o
pertinent subjects such as the surgery of port
hypertension. The magnitude of EEG waves and t
forms in normal and psychopathologic conditions
are outlined. The data from the author's 256 patients have been correlated and analyzed in
every possible way. Of these 256 patients, 14
were not operated upon, including 10 with deco
pensated livers, 59 with varices without bleed
and 73 with bleeding varices; 114 patients had undergone operations and had direct portacaval anastomoses. These larger unoperated and opera
groups were subdivided into 4 groups each on t
basis of compensated and uncompensated cirrhos
time of shunt operation, etc. Simple and typi
values result from the comparison of encephalo
determined clinically (C) and by means of the
in these 8 subgroups: (1) 13% C, 2% EEG; (2) 2
18% EEG; (3) 41% C, 25% EEG; (4) 29%, C, 11% EE
(5) 29% C, 9% EEG; (6) 38% C, 7% EEG; (7) 32% C
8% EEG; (8) 30% C, 3% EEG. Three times as many
patients with encephalopathies were detected clinically as were by the EEG. Neurohistologic

minations disclosed no neural changes which
ld be correlated with the changes observed
the EEG of some patients, nor could histo-
hological liver findings be correlated with
encephalopathies.

4 FATAL CASE OF PASTEURELLA PSEUDOTUBER-
CULOSIS INFECTION ASSOCIATED WITH
ATIC CIRRHOSIS. (E.) Macaulay, J. D.
lford Hosp., England), J. A. C. Wilson, J. D.
ott and N. S. Mair. Brit. Med. J. 2(5551):
-554, 1967.

5 THE FUNCTIONAL STATE OF THE LIVER AFTER
SURGERY PERFORMED FOR PORTAL HYPERTEN-
I. (Rus.) Emel'ianova, Iu. M. (Leningrad
Res. Inst. Disability Evaluation & Rehabil-
tion of Disabled Workers). Vestn. Khir. Grekov.
):23-28, 1967.

A STUDY ON THE EXCRETION OF WATER AND
ELECTROLYTES IN CIRRHOSIS OF THE LIVER.
A STUDY ON THE WATER EXCRETION IN CIRRHOSIS
HE LIVER. (Kor.) Choi, K. W. (Seoul Nat. U.)
ean J. Intern. Med. 10(1):1-7, 1967.

A STUDY ON THE EXCRETION OF WATER AND
ELECTROLYTES IN CIRRHOSIS OF THE LIVER.
A STUDY ON THE ELECTROLYTE EXCRETION IN
HOSIS OF THE LIVER. (Kor.) Choi, K. W.
ul Nat. U.). Korean J. Intern. Med. 10(1):
, 1967.

PROLONGED USE OF SPIRONOLACTONES IN
HEPATIC CIRRHOSIS. (Fr.) Muller, M. B. (St. Etienne Hosp., France) and D. David. Loire Med. 71(2):36-45, 1967.

7629 EFFECT OF A FLAVONOID ON CAPILLARY RESISTANCE IN HEPATIC CIRRHOSIS. (Fr.) Wild, C. (Med. U., Lausanne, Switzerland) and J. Fasel. Praxis 56(20):698-699, 1967.

7630 CIRRHOSIS OF LIVER IN INFANTS AND CHILDREN. (E.) Jones, E. (U. Tennessee Coll. Med., Memphis). Southern Med. J. 60(1):57-62, 1967.

7631 THYROID FUNCTION IN HEPATIC CIRRHOSIS. (It.) Torri, A. (U. Modena, Italy), L. Marani, V. Piaggi and G. Zoppetti. Folia Endocr. (Roma) 19(5):612-619, 1966.

7632 MESENCHYMAL CIRRHOSIS. (Sp.) Jiménez Diaz, C. (Jimenez Diaz Found., Madrid), H. Oliva, V. Navarro and M. C. Rivas. Rev. Clin. Esp. 104(3):195-215, 1967.

7633 HEPATIC CIRRHOSIS. ETIOLOGIC ASPECT. (Fr.) Kânčev, K. N. (Pavlov Inst. Higher Med. Stud., Plovdiv, Bulgaria). Folia Med. (Plovdiv) 8(5):282-288, 1966.

7634 CRITERIA FOR THE CLINICAL AND THERAPEUTIC MANAGEMENT OF THE PATIENT WITH HEPATIC CIRRHOSIS REQUIRING PROLONGED ATTENTION. (Sp.) Manzanilla, M. A. (Nat. U. Mexico, Mexico City), J. A. Athie and M. A. F. Garcia. Rev. Fac. Med. (Mexico) 9(2):91-107, 1967.

See also abstract nos.: 6848,7163

7635 ARTERIAL CHANGES IN GANGRENE OF THE GALLBLADDER. (E.) Hargrove, T. K. (Harper Hosp., Deteroit, Mich.) and J. R. McDonald. Harper Hosp. Bull. 25(3):125-129, 1967.

A study was made of gangrene of the gallbladder (24 female, 21 male; 30-83 yr. old) who had undergone cholecystectomy between 1959-1966. Presenting signs included low grade fever (96%), WBC up to 15,000/ml (70%), acute pain (71%), a history of diabetes mellitus or arteriosclerotic heart disease (28%), and gallstones (90%). Original sections were stained with Verhoeff's elastic stain and a Van Gieson counterstain to delineate connective tissue, muscle and elastic lamina. Cross sections of several arteries in adventitial layer of wall were measured in each, using an ocular micrometer, and the av. ratio of thickness of arterial wall/lumen diameter was calculated as 0.5 X (external diameter - internal diameter)/internal diameter. Gross appearance of gangrenous gallbladder varied considerably. In the healing stage the wall became thick and fibrotic, with most severe fibrosis external to the mucosal coat. Mucosal necrosis, inflammation and hemorrhage were found in all specimens. Necrosis was transmural in 30% and limited to mucosa and muscularis in the rest. Gangrene was focal in 48%. Some thrombosed arteries were present in 34%. Of 81 perimuscular arteries measured, 54 showed concentric thickening, 27 eccentric. Thickening was limited to the intima, and the internal elastic membrane was intact. Av. ratio was 2.04 (range 0.5-16.0), whereas the generally accepted ratio in systemic arteries in 0.5. It is suggested that the primary lesion in the pathogenesis of gangrenous cholecystitis is arteriosclerotic thickening of the intima of gallbladder arteries. Although present in 90% of the cases, gallstones do not appear to be necessary for development of gangrene of the gallbladder.

7636 SURGICAL TIMING IN BILIARY TRACT DISEASE. (E.) Bruce, T. A. (U. British Columbia, Vancouver, Canada) and R. C. Harrison. Canad. Med. Ass. J. 96(18):1252-1257, 1967.

In a 4-yr. study of 991 cases of biliary tract disease, an elective operative mortality of 0.6% was observed (0.5% below age 65, 1.6% above), while that for acute cholecystitis was 4.4%. In 21 of 28 patients with acute cholecystitis, symptoms and signs subsided within 48 hr. of conservative management. On this basis, a 2-day trial of conservative management with gastric suction is suggested, with operation only for those not showing definite improvement. Operation is suggested for those with cholelithiasis with the view of reducing the risk of acute cholecystitis and of the high incidence of carcinoma accompanying cholelithiasis. Surgery did not always bring relief of "cholecystic indigestion," but a removal of the gallbladder and stones was often accompanied by relief from recurrent attacks of colic, and elimination of risks associated with acute cholecystitis, pancreatitis, ascending cholangitis, destructive jaundice and carcinoma of the bladder. Patients with a ruptured gallbladder should have minimal emergency operative treatment.

·7637 "SOLITARY DILATATION" OF THE BILIARY TRACT AS A PRINCIPAL FACTOR IN THE POST-CHOLECYSTECTOMY SYNDROME. (Fr.) Mallet-Guy, P. (Fac. Med., Lyon, France) and M. Gignoux. Lyon Chir. 63(1):45-72, 1967.

The post-cholecystectomy syndrome was noted in 492 of 6000 patients; solitary dilatation of the common bile duct was noted in 25 (5%) of this group. Recurrent symptoms developed within 1 yr in 10 cases, after 1-5 yr. in 11 cases, and afte 9-17 yr. in 3 cases; they tended to reproduce the symptoms of the initial episode. None of th patients responded to drug or hydromineral treatment. In 10 patients, dilatation of the common bile duct was observed at the time of cholecystectomy; the other 15 patients had been treated elsewhere and were observed by the authors only when recurrent symptoms developed. In the latte group, hypotonia of the sphincter of Oddi was noted in 9 cases; in the other 6 patients the sphincter was functionally normal. Right splanchnicectomy was performed in 8 patients; choledochoduodenostomy was indicated in the presence of marked dilatation of the sphincter o Oddi. Of the 14 operated patients followed up for 1 yr. or more (max. 10 yr.), 10 showed excellent responses; 1 patient showed an excelle response after repeat surgery to eliminate the anastomosis, 2 showed good responses, and 1 show a moderate response. No therapeutic failures we noted. This procedure is recommended to prevent the post-cholecystectomy syndrome.

7638 SYNDROME RESULTING FROM PARTIAL CHOLECYSTECTOMY. CLINICAL CONTRIBUTI (It.) Gatti, G. (Civil Hosp., Ivrea, Italy). Gazz. Int. Med. Chir. 71(17):1497-1513, 1966.

A review of the etiology, pathology and treatmen of post-cholecystectomy syndromes is complemente by report of 4 patients (1 man, 3 women; aged 38-52) who underwent partial cholecystectomy for chronic (3 of 4) or acute (1 of 4) cholecystitis and calculi. The patients returned to treatment 3-9 yr. later, after developing a syndrome consi ing of attacks of incapacitating pain, severe epigastric distress and dyspepsia. Pain could be precipitated in all cases by ingestion of fat in any form; 2 of 4 had also developed recurrent fever; 1 of 4 had transient attacks of jaundice. The biliary stump could be visualized in 3 of 4 and proved to be encysted and ectasic in all 3. Chronic pancreatitis and papillitis, without apparent involvement of the terminal segment of

e choledochus, had also developed in 1 of 4
o underwent papillostomy at the time of reinter-
ntion. The biliary stump was removed in
tirety in all patients, all of whom made un-
entful recoveries and were completely symptom-
ee at the time of follow-up, 6 mo. later. Also
ported is the case of a 49-yr.-old man in whom
newhat similar, but not incapacitating, symptoms
veloped, 6 yr. after partial cholecystectomy
r chronic cholecystitis and cholelithiasis, and
o recovered satisfactorily in response to diet
d symptomatic treatment alone.

39 CLINICAL SIGNIFICANCE OF THE AMPUTATION
NEUROMA AND LENGTH OF THE CYSTIC DUCT
MNANT. (E.) Berge, T. (U. Lund, Sweden) and
Haeger. Acta Chir. Scand. 133(1):55-60, 1967.

e cystic duct remnant in 40 cholecystectomized
ients (25 men, 15 women; 46-82 yr.) was measured
d examined histologically at autopsy. The
gth was measured with a catheter in its lumen.
e duct was then sectioned into 3-4 mm segments
ch were examined in relation to the degree of
rosis, tendency to nerve proliferation, and
mation of neuroma. The case histories were
died independently of knowledge of histologic
dings. Patients were classified into 4 groups:
never any postoperative abdominal symptoms;
symptoms which might have derived from the
iary tract; 3) symptoms fairly definitely
ginated in the biliary tract; 4) symptoms in
likelihood originated in the biliary tract,
aracteristic postcholecystectomy syndrome."
27 patients asymptomatic after operation, there
e 12, 5, 7, and 3 in Groups 1-4, resp. The
gth of the cystic duct was less than 1 cm in
1-2 cm in 9; 2-3 cm in 6; 3-4 cm in 5; 5-6 cm
1. Histological findings ranged from slight
rosis through more or less marked proliferation
nerves to classical amputation neuroma. Two
t remnants were wholly without demonstrable
tological changes, the rest having fibrosis of
ying degree. Distinct amputation neuroma was
erved in 11. In 6, such marked proliferation
nerves was seen as to be rated as a tendency
ard neuroma formation. There was no correla-
n between the length of duct remnant and
urrence of postoperative symptoms attributable
the biliary tract. There was also no
tistically significant difference in frequency
patients who were asymptomatic postoperatively
in those in whom symptoms probably attributable
the biliary tract were found. Caution should
used in suggesting that a neuroma, when found,
a long cystic duct remnant is in itself re-
nsible for the postcholecystectomy syndrome.

0 REACTIVE PROLIFERATION OF INTRAHEPATIC
BILIARY PATHWAYS. (EFFECTS OF OCCLUSION
OF SUBSEQUENT BILIARY RECANALIZATION.) (It.)
tiglioni, G. C. (U. Sassari, Italy). Gazz.
. Med. Chir. 72(4):277-298, 1967.

rats weighing 230 g at the start of the experiment, induction of cholestasis by ligation and section of the common bile duct resulted in marked dilatation and intense, progressive proliferation of intrahepatic biliary pathways, accompanied by degenerative changes in the liver parenchyma; a slowing in gain in body wt., as compared to controls; progressive increase in the relative wt. of the liver; marked, progressive increase of serum levels of cholesterol and total bilirubin; and portal hypertension. Subsequent resolution of the occlusion, after 1-51 days, by means of a cannula inserted into the dilated remainder of the choledochus, resulted in rapid, progressive reversal of all these changes, accompanied by atrophy of the neoformations and restoration of normal hepatic lobar architecture. However, the degree of normalization which could be achieved appeared to be inversely proportional to the duration of cholestasis, with permanent residual damage evidenced in animals in which the occlusion had been maintained for more than 21 days. The mortality rate for the second intervention also increased abruptly, rising from 17.3% when cholestasis had been maintained for 14 days, to 66.6% when it had been maintained for 21 days or more. This increase, in turn, was accompanied by a comparable reduction of subsequent survival times.

7641 FUNCTIONAL AND MORPHOLOGIC STUDY OF THE GALLBLADDER IN PATIENTS OPERATED FOR GASTRODUODENAL ULCER. (It.) Sarti, G. (U. Rome), L. Saracca, M. Ermini and N. Basso. Gazz. Int. Med. Chir. 72(1):5-23, 1967.

Cholecystography and X-ray studies of the biliary passages were performed in 5 groups of patients after surgery consisting of gastric resection plus gastrojejunostomy, gastric resection plus gastroduodenostomy, selective vagotomy, selective vagotomy plus pyloroplasty, or selective vagotomy plus antrectomy plus gastroduodenostomy. The studies in question were made 20 days-4 yr. after surgery, and some of the patients in each group were studied in similar fashion prior to surgery. In all 5 groups, gallbladder tonus was sharply reduced after surgery, with the most marked reduction occurring in patients undergoing vagotomy. THe degree of opacification of the gallbladder which could be obtained postoperatively was reduced appreciably, and equally, in all groups. The gallbladder's ability to contract remained essentially unimpaired in all groups, although the absolute values for initial and terminal vol. were considerably increased, indicating an inability to empty completely. This, in turn, was believed to be due to some unidentified, secondary pathology.

7642 CHOLANGIOGRAPHY WITH MECHANICAL BLOCKAGE OF THE AMPULLA OF VATER. (Fr.) Treheux, A. (Cent. Serv. Radiol., Nancy, France), J. Fays and M. Crestin. Ann. Med. Nancy 5(Nov.): 873-882, 1966.

A technic of cholangiography which involves the mechanical blockage of the ampulla of Vater by a balloon placed in the duodenum is described in detail. When this technic was applied to 31 subjects who had presented negative results when submitted to the usual i.v. cholangiographs, only 3 cases failed to give positive results. Two of these presented jaundice and the third, portal hypertension. In 3 other cases the opacification of the biliary ducts were only of medium quality, but in the remaining 25 cases the opacification was excellent. Probably the most useful application of this technic is with patients who have undergone sphincterotomies, of whom 3 cases in this report had presented strictly negative results after the usual cholangiograph, but in whom the bile ducts presented satisfactory images with this balloon technic. With this technic intrahepatic biliary ducts were also completely visible. A catheter 1.3 meters in length whose end is expandable is inserted in the duodenum so that the end of the balloon is about 1 cm from the curve of the superior genu. With the catheter in place 2 ampules of Antrenyl oxyphenonium are inj. i.v. to create a hypotonic duodenum. Afterwards the contrasting medium is inj. by a direct i.v. route (usually 20 ml). Ten min. after the inj. of the opaque soln. the balloon is expanded with 70 ml of water. The first film is taken 30 min. after this inj. and then 30, 45 and 90 min. later. The patients are made to fast for the 12 preceding hr. No complications were encountered and the intubation was well tolerated in all cases where fasting was observed.

7643 LOBECTOMY (IV) FOR THE SURGICAL EXPOSURE OF INTRAHEPATIC BILIARY DUCTS. (Fr.)

Champeau, M. Mem. Acad. Chir. (Paris) 93(4-5): 164-174, 1967.

A surgical technic for subtotal lobectomy of segment IV of the liver is described which allows clear visibility of the hepatic hilus as well as the principal pedicles, 4-5 cm of the left biliary canal and 7-8 cm of the right biliary canal, as well as more minor intrahepatic ducts. This technic includes the following stepwise procedures which allow minmum or max. displacement of segment IV: detachment of the hilus plaque just to the superior border of the bifurcation of the pedicles, freeing of the round ligament with an incision of the inferior parenchymal bridge, opening of the large hepatic fissure at the left of the origin of the middle subhepatic vein just to the level of the detached hilus sheet, then, with a transverse and perpendicular cut (digital) of the dorsal capsule, the lobe can be removed. This operation is neither traumatic nor bloody, as main vessels are not involved. In 2 cases, repair of gross liver damage was made possible by this technic; the one involving the ablation of a vesicular cancerous tumor invading the hilus area as well (papillary epithelioma) and the other allowed repair of intrahepatic biliary ducts as well as an anastomosis between the liver and intestine which again permitted good bile flow and hepatic function.

7644 CHOLANGIOCHOLECYSTOGRAPHY BY INTRAMUSCULAR INJECTION, USING SH-847. (It

Palmieri, G. C. (U. Ferrara, Italy), C. Cheli, A. Biolcati-Rinaldi and G. Voltolini. Radiol. Med. (Torino) 52(10):993-1001, 1966.

A modified form of "Bilivistan" (SH-847), with pH increased from 6.4 to 7.2-7.4 by the addition of sodium citrate, was inj. i.m. into 132 subjec of both sexes (10 ml plus 250 U.S.P. U hyaluroni into each buttock). Tolerance is reported as excellent, with minimal local or systemic allerg reactions and with good visualization of the biliary tract within 60 min. and optimal visuali tion within 2 hr. Included were patients with cholecystitis, cholelithiasis, calculi in the biliary ducts and related disorders.

7645 ANGIOGRAPHIC DEMONSTRATION OF THE ARTERIES OF THE GALLBLADDER. (Ger.)

Wenz, W. (U. Heidelberg, Germany). Fortschr. Roentgenstr. 106(3):387-392, 1967.

Among more than 70 selective angiographs of the celiac or hepatic arteries, 8 showed clearly th vascular branches of the circulatory bed of the cystic artery; improved visualization facilitat the desired differentiation of the hepatic arte proper, a condition not always technically poss A clear delineation of the wall of the gallblad is sometimes seen in the capillary phase of ser arteriography yielding information about the condition of the bladder; angiographs of a norm and an obstructed gallbladder are presented as well as the selective arteriography of a gallbladder showing tumors of the bladder and bile ducts. No comparable differentiation of change caused by stones or inflammation is possible. The topography of the cystic arteries in 3 case is described, the first a case of arteriovenous fistula, the second a case of cystadenoma, and the third, a case of cystic carcinoma. The pattern of the vascular bed showed considerable differences among these 3 cases. With differen diagnosis of late abscess following cholecystec or tumor remnants in the gallbladder celicograp should be performed; 25 ml of 76% diatrizoic ac inj. proximal and close to the point where the left gastric artery branches. The selective angiography of the celiac is superior to that of the hepatic artery.

7646 SURGICAL TECHNIC FOR BILIARY DUCT REVISION IN CHOLELITHIASIS BASED UPON 1180 CHOLEDOCHOTOMIES. (Ger.)

Kourias, B. (Greek Red Cross Hosp., Athens). Chirurg 38(5) 214-220, 1967.

The surgical technics involved in revision of the bile ducts in 1180 cases are described in detail under the headings: 1) Simple and somew difficult cases including choledochoduodenostom 2) Uncommon or complicated cases: A) coexisten of anomalies and variations of the extrahepatic bile ducts; B) spontaneous fistulas between the

llbladder and bile ducts in the liver; C)
thiasis of the intrahepatic bile ducts; D)
ronic pancreatitis; E) coexistence of liver
hinococcus with and without rupture; 3) second
multiple operations. Cholangiographies,
ken pre- and postoperatively in 80-90% of the
ses, were extremely useful. The cholangioscope,
ployed in 260 cases, was an excellent aid. No
liance was placed upon manometry because false
sults, sometimes obtained under the circum-
ances, can lead to serious mistakes. The
ical surgical methods in the removal of stones
ch as dilatation of the papillary passage,
ecific drainage, primary suturing and choledocho-
odenostomy were not adequate in many instances.
e special operative procedures, often necessary
insure good initial and lasting results, are
cribed in accounts of specific cases. Of the
0 patients 93% had operable defects and 7%
e negative. The operated cases included 146
es (12.3%) with anomalies and variations of
extrahepatic ducts; 126 cases (10.6%) having
ernal spontaneous fistulas; 96 cases (8.1%)
intrahepatic lithiasis; 98 cases (8.2%) of
onic pancreatitis; 126 cases (10.6%) of
nosing papillitis; 35 cases (2.9%) of liver
inococcus; 137 cases (11.6%) with 2 or more
rations. A number of other pathologies,
urring with less frequency, made up the total
1180; some of these were cirrhosis, cardio-
cular disorders and diabetes. The high
centage of positive findings (93%) was due to
frequency of severe and neglected cases. The
tality rate for intrahepatic lithiasis was
h (14.5%) and for reoperations, 9.49%. The
rall mortality rate for 1180 patients was
%; the lowest rate was for uncomplicated
lecystectomy, 0.43%. The early operation is
refore favorable.

7 BILIODIGESTIVE ANASTOMOSES IN THE
LIVER HILUS FOR STRICTURES OF THE
LBLADDER. SURGICAL TECHNICS AND RESULTS IN
CASES. (Ger.) Baumann, J. (City Hosp.,
sel, Germany). Chirurg. 38(5):202-209, 1967.

a total of 7500 biliary operations, 54 bilio-
estive anastomoses, performed from 2-9 yr.
, have proved to be good to very good in 83.3%
cases. In biliodigestive anastomoses involving
rahepatic bile ducts, the prospect of healing
been less the closer to the hilus the
stomosis was constructed. The favorable results
attributable to the great width of the
stomosis and the small tendency to shrinkage.
lux of food material is not harmful in view
ts rapid return into the duodenum through
wide anastomosis, regularly observed by X-
Very severe cholangitis, seen in 10 cases
mo. duration, and in 15 cases of over 26 mo.
ding, were healed; simultaneously the active
r cirrhosis arising from cholangitis and
estasis was arrested or, as in most cases in
series, healed. The basic surgical technic:
omentum, the transverse colon, the duodenum and
gastric antrum up to the free portion of the
forward wall of the stomach were freed from the inferior side of the liver so that the underside of the liver presented a wide, clear field. The duodenum was freed from the omentum and transverse colon. The transsection of the ligaments teres and falciforme followed; then the forward wall of the liver was separated from the ribs and the diaphragm, mobilizing the liver. The particular surgical procedure, from this point, varies considerably depending upon the specific case.

7648 RAPID DIAZO METHOD FOR THE DETERMINATION OF TOTAL BILIRUBIN WITH A COMBINATION OF REAGENTS. (Ger.) Hillmann, G. (City Hosp., Nuremberg, Germany) and G. Beyer. Z. Klin. Chem. 5(2):92-93, 1967.

The method of Malloy-Evelyn, modified by Rand and Di Pasqua (substitution of sulfanilic acid with 2 and 4 dichloranaline) is further modified by the substitution of ethylene glycol for methyl alcohol; ethylene glycol has the advantage of not causing precipitation of protein while having the same accelerating effect upon the formation of azobilirubin. The spectrum of the azobilirubin compound in ethylene glycol lies between 545 and 550 mμ instead of the 540-544 mμ in methyl alcohol. In the Rand and Di Pasqua method the color reaction is stable for 30-40 min.; with the use of ethylene glycol the color is stable for more than 5 hr.; measurement at 550 mμ is made after at least 2 min. to allow for the development of color. Extinction of the azobilirubin compound is proportional to the bilirubin content. For the routine microtest 0.2 ml hemolysis-free serum or plasma is used; with strongly jaundiced sera 0.1 ml is employed. Reagents: 0.01 M 2,4-dichloranaline in 0.25 N HCl; 0.1 M $NaNO_2$ in H_2O; ethyleneglycol. Diazo reagent A: 50 ml of dichloranaline soln., mixed with 1 ml nitrite soln. is placed in the refrigerator for 15 min. at 6° C after which 250 ml of ethylene glycol is added to the mixture. Reagent A keeps for 12 hr. at room temperature and for 48 hr. at 6° C. Reagent A (3 ml) is mixed with 0.2 ml of serum to be tested. Where necessary blanks and standards can be used. This test has a 98% correlation coefficient with the Jendrassik/Grof test; its sensitivity is 0.4 mg% and its precision is ± 0.2 mg% at a mean conc. of 5.7 mg%.

7649 CYTOLOGICAL STUDIES AND FUNCTIONAL DIAGNOSIS OF PANCREATIC AND BILIARY DISORDERS. (Dut.) Orsini, G. C. (Gen. Hosp., Potterdam, Netherlands), D. I. Blonk and G. J. H. Den Ottolander. Nederl. T. Geneesk. 110(48):2115-2119, 1966.

A cytologic diagnostic test of the functions of the pancreas and the biliary system was evaluated in 34 patients. Fluid was collected from the duodenum without dilution by gastric juice. The duodenal fluid was collected for a 20-min. control period, then 1 U secretin/kg body wt. was inj. i.v., and 10-min. portions of fluid were collected.

After secretion vol. had returned to normal, cholecystokinin, 1 U/kg body wt., was inj. and again duodenal fractions were collected. These portions of fluid were analyzed for pH, bicarbonate conc., bilirubin, amylase content; vol. of fractions were obtained. The combined fractions for each inj. were then centrifuged (8000 rpm) and the sediment streaked on microscope slides, air-dried and stained and carried up into mounting medium and covered. Examination of these slides yielded definite diagnoses in only 6 cases; 4 Fout-negative and 2 class III, Papanicolaou. In 4 cases where malignant changes of the pancreas and the biliary ducts were found at operation or later at autopsy, the cytologic test proved negative. Through the usual diagnostic means including the tests on the duodenal fluid, the group of 34 patients had 8 with cholelithiasis, 3 with sclerotic pancreas, 2 each with pancreatic carcinoma, splenomegaly, pancreatitis, gallbladder carcinoma, and wt. loss and 1 each with unrelated tumors, liver carcinoma, abdominal pain, pneumonia, obstructive jaundice, metastasized carcinoma, steatorrhea and hepatomegaly, and carbon monoxide intoxication.

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GASTROENTEROLOGY

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AND
CITATIONS

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology had accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Gr.	Greek	Pol.	Polish
Ar.	Arabic	Heb.	Hebrew	Por.	Portuguese
Bul.	Bulgarian	Hun.	Hungarian	Rum.	Rumanian
Ch.	Chinese	Ic.	Icelandic	Rus.	Russian
Cz.	Czech	In.	Indonesian	Ser.	Serbo-Croatian
Dan.	Danish	It.	Italian	Sl.	Slovene
Dut.	Dutch	Jap.	Japanese	Sp.	Spanish
E.	English	Kor.	Korean	Sw.	Swedish
Eston.	Estonian	Latv.	Latvian	Th.	Thai
Fin.	Finnish	Lith.	Lithuanian	Turk.	Turkish
Fr.	French	Maced.	Macedonian	Uk.	Ukrainian
Ger.	German	Nor.	Norwegian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	µM	micromolar
admin.	administered, administration	max.	maximum, maximal
ADP	adenosine diphosphate	mc,µc	milli-, microcurie(s)
ATP	adenosine triphosphate	mg	milligram(s)
approx.	approximately	min.	minute(s)
av.	average(d)	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
°C	degrees centigrade	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
CNS	central nervous system	ng	nanogram (10-9)
conc.	concentrate(d),	pg	picogram (10-12)
	concentration(s)	p.o.	orally
cpm	counts per minute	ppm	parts per million
DNA	deoxyribonucleic acid	r	Roentgen
e.g.	for example	RBC	red blood cells (erythrocytes)
g	gram(s)	resp.	respectively
µg	microgram(s)	Rev.	review (only in cite)
hr.	hour(s)	RNA	ribonucleic acid
i.m.	intramuscular	s.c.	subcutaneous
inj.	injected, injection(s)	sec.	second(s)
i.p.	intraperitoneal	SGOT	serum glutamic-oxalacetic transa
I.U.	international unit(s)	SGPT	serum glutamic-pyruvic transamin
i.v.	intravenous	soln.	solution(s)
kg	kilogram(s)	U	unit(s)
LD_{50}	median lethal dose(s)	UV	ultraviolet
LDH	lactic acid dehydrogenase	vol.	volume
m	meter(s)	WBC	white blood cells (leukocytes) o
M	molar		count
mEq	milliequivalent(s)	wk.	week(s)
mM	millimolar	wt.	weight(s)

yr. years

NUMBER AND SEPARATION OF ENZYMES IN THE
MUCOSA OF THE GASTROINTESTINAL TRACT OF
I!. . HISTOCHEMICAL AND SUPPLEMENTARY
ES ON ISOENZYMES. (Ger.) Klein, U. E. (U.
Kiel, Germany), H. C. Drube and H. T.
en. Klin. Wschr. 45(2):95-101, 1967.

sal tissue was taken at operation from the
ach, the duodenal bulb and the first loop of
jejunum; tissue was also obtained by biopsy
the duodenum, jejunum and rectum. Patients
ileostomies furnished samples from the ileum.
tissues were used freshly frozen or kept
en at -20°C for periods up to 2 wk. Frozen
ions were mounted on coverslips and histo-
ical tests were made for the various enzymes.
isoenzymes of alkaline phosphatase were
ated by extraction of homogenates, electro-
esis, and staining, before and after fat
ing; alkaline phosphatase was also determined
he chyle of the thoracic duct of 1 patient.
ll mucosal samples unspecified esterases,
phosphatase, thiamine pyrophosphatase,
inic dehydrogenase and LDH were demonstrable.
in the small intestine did sucrase, lactase,
line phosphatase, leucine aminopeptidase, and
osine triphosphatase (ATPase) appear and
ease in conc. (not equally). The parietal
s of the gastric mucosa showed more intense
tions for the enzymes present than did the
f cells. The 2 different sites of enzyme
lization in the small intestinal epithelium
the crypts of Lieberkühn and the villi; the
i and especially the apical epithelium showed
conc. of leucine aminopeptidase, alkaline
phatase ATPase, and were the only cells hav-
disaccharidases. All the enzymes found in
stomach were present in the rectum. In the
enum, alkaline phosphatase, leucine amino-
idase, ATPase and disaccharidases were
eased in cells with brush borders, although
capillary and vascular endothelium in these
ons had unchanged intensive color reactions
alkaline phosphatase, and ATPase. The
line phosphatase of the small intestine was
rated into 3 fractions which were inhibited
-phenylalanine, distinguishing the intestinal
line phosphatase from those of other tissues
ot so inhibited. The chyle from the thoracic
possessed 2 fractions of alkaline phosphatase
ating toward the anode of the electrophoretic
d, the slower migrating at the same rate as
middle fraction of the small intestinal
line phosphatase; and like this intestinal
tion, inhibited by L-phenylalanine; the
er fraction had the characteristics of serum
line phosphatase. Oral fat-loading intensi-
the 3 intestinal fractions of alkaline phos-
ase, especially the middle one, but had no
ct upon serum alkaline phosphatase. The
acellular localization of the enzymes is
ribed in detail.

EFFECTS OF RESERPINE ON THE DIGESTIVE TRACT OF ANIMALS. (Rus.) Smejkal, V. (Res. Inst. Pharm. Biochem., Prague). Biull. Eksp. Biol. Med. 63(2):64-67, 1967.

Reserpine (0.25 mg/kg) was admin. i.p. to male Wistar rats (150-200 g) on the first, third and fifth days of the experiment; methoxyphenoserpine (in a dose, unspecified, producing catharsis) was given on the sixth day. The relationship of blood pressure to gastric motility was studied in Chinchilla rabbits (both sexes; 2-3 kg wt.); neostigmine (12.5 µg/kg) was admin. i.v. to control and experimental animals 30 min. before the admin. of reserpine (1 mg/kg). The first 2 doses of reserpine induced catharsis in 9 of 10 rats, but the third dose produced this effect in only 1 rat. Similar results were obtained with methoxyphenoserpine (10 mg/kg, admin. i.p.). Catharsis disappeared after admin. of reserpine on the sixth day. There was no correlation between changes in blood pressure and gastric motor activity. Similar results were obtained with methoxyphenoserpine. The lack of correlation between changes in blood pressure and changes in gastric motor activity in rabbits after admin. of reserpine indicates that this drug acts differently on the cardiovascular system and the gastrointestinal tract.

7706 ANAPHYLACTOID REACTION AND THE INTESTINAL MUCOSA. (Hun.) Ihász, M. (University of Budapest, School of Med.), J. Füsy, G. Karika and I. Kiss. Kiserl. Orvostud. 18(6): 608-611, 1966.

One-ml amounts of various dilutions of 3.5% polyvinylpyrrolidine in Ringer's soln. were inj. into the mesenteric artery of fasting dogs (15-20 kg) under narcosis. The intestinal mucosa was observed in situ. Approx. 1 min. after admin. of the polyvinylpyrrolidone the movement of the villi stopped for 2-3 min. During this time the villi contracted and the secretion of the mucosa increased. However, the arterial blood pressure did not change. The normal movement of the villi returned after another min. Similar, but less pronounced, effects were observed with higher dilutions of the drug. When large amounts of drug were inj. into the femoral vein, a general anaphylactoid reaction was induced, e.g., 3 min. after admin. of 1 ml/kg of the soln., the arterial pressure as well as the movement of villi began to decrease in parallel. The former reached a minimum 5-6 min. later. At that time the villi contracted and their movement stopped. The intestinal mucosa became slightly anemic and its secretion increased. Thereafter the blood pressure increased gradually and the movement of the villi was restored. However, some of the animals who received high doses of the drug died. Control experiments revealed that local application of polyvinylpyrrolidone did not affect the function of the intestinal mucosa.

GENERAL

7707 CHLORTETRACYCLINE AND MOUSE INTESTINAL WALL. (E.) Rosen, H. (Walter Reed Army Med. Ctr., Washington, D. C.), A. Einheber, N. D. Brown and R. E. Wren. Nature (London) 214(5089):671-674, 1967.

Each mouse received either 100 mg/kg freshly prepared chlortetracycline or an equivalent wt. of sterile 0.9% saline i.p. for 6 consecutive days. Germ-free mice (Group 1) were compared with "conventionalized" mice (Group 2). Tissues were assayed for histamine and serotonin. Body wt. were essentially the same for both groups of the same sex, but the cecum and the small and large intestines were heavier (on a body wt. basis) in Group 1 of either sex, the difference being more marked in females. Females in Group 2 showed the greatest gains in wt. of both the small and large intestine. The serotonin conc. of intestinal tissue increased only in Group 2 females, and decreased in all other groups. The histamine conc. in all the intestinal segments decreased in all groups, the decrease being greatest in females. The unique reaction of Group 2 to the drug was also shown by their severe body wt. losses (13%), large loss of spleen mass (38%), and by the fact that 2 died. The males in Groups 1 and 2 and females in Group 1 lost only 5%, 5%, and 3% of their control body wt., resp., and 8%, 8% and 5% of their control spleen wt.; there were no deaths among them. It appears that a mechanism is operative in females which renders them more liable to chlortetracycline-induced intestinal changes irrespective of their microbial status, and that the absence of a microbial flora modifies and/or attenuates these changes. Chlortetracycline-induced changes in intestinal serotonin and histamine did not correlate with concomitant changes in intestinal mass. In reference to use of this drug in humans, it is suggested that the reported gastrointestinal upsets may be caused not by alterations of the intestinal flora alone, but also by alteration of the serotonin and histamine levels in the intestinal tract tissue.

7708 INHIBITION OF PROTEIN SYNTHESIS IN RAT INTESTINAL SLICES BY TETRACYCLINE. (E.) Greenberger, N. J. (Ohio State Univ. Coll. Med., Columbus). Nature (London) 214(5089):702-703, 1967.

Female rats, fasted for 16 hr., were given either saline (controls, 12) or tetracycline (400 mg/kg, i.p., 10). Protein synthesis was measured by the incorporation of ^{14}C-leucine in jejunal slices. There was a statistically significant decrease in incorporation of the label into protein by jejunal slices obtained from experimentals (109.5 X 12^{-12} M/0.5 g jejunal slice) as compared with controls (155.2). Results indicate that tetracycline treatment may result in inhibition of protein synthesis in intestinal mucosa. It is suggested that this tetracycline effect might be due to inhibition of amino acyl-sRNA binding to ribosomes.

7709 SOME OBSERVATIONS ON 'AUTOREGULATORY ESCAPE' IN CAT INTESTINE. (E.) Bake R. (King's Coll., London) and D. Mendel. J. Physiol. (London) 190(1):229-240, 1967.

Studies were carried out on anesthetized cats determine the mechanism of autoregulator escap and its relation to the opening of the shunts, whether the escape is associated with sympathe nerve stimulation or whether it also occurs wh intestinal blood is reduced by other means, whether intestinal movement is involved, or whether an alteration in local pH causes any of sensitivity to sympathetic amines. The sympathetic nerves in the sheath around the superior mesenteric artery were prepared for stimulation. The main mesenteric artery (divi into 3 branches for the experiment), the splen vein, femoral artery and vein (and superior mesenteric vein when necessary) were prepared for cannulation. The animals were heparinized Blood flow to the intestine was measured with the density flowmeter method, with a modified circuit (2 double triode valves controlling 2 multicontact relays); accuracy was within ± 3% over the range 1-40 ml/min., with a pressure drop of 1 mm Hg at the highest rates of flow. Resting flow through the intestines ranged fro 6-32 ml/min. at an av. pressure of 90 mm Hg. The av. initial O_2 consumption was 0.91 ml/min 100 g. "Escape" was found to be peculiar to norepinephrine infusion and splanchnic nerve stimulation, and was not observed during hemorrhage or obstruction of the arterial infl with a screw clip. Flow recovery during norep phrine infusion was not explained by intestina motility changes or long norepinenephrine effe (caused by changes in portal venous pH). An initial reduction in O_2 consumption and a fall blood pressure during norepinephrine infusion, was followed by increased O_2 consumption durin the period of "autoregulatory escape." Portal venous pH and O_2 content were also measured. A clear explanation of the escape mechanism wa not found, but it was suggested that a number possibilities were eliminated.

7710 CHANGES IN THE EXCITABILITY OF THE INTEROCEPTORS OF THE SMALL INTESTINE ANAPHYLAXIS (AN ELECTROPHYSIOLOGICAL STUDY). (Rus.) Lebedeva, V. A. (Pavlov Inst. Physiol. Acad. Sci., Leningrad, USSR), B. I. Padegimas and I. L. Pines. Biull. Eksp. Biol. Med. 63(3) 44-48, 1967.

This study was performed on 22 cats under urethane narcosis (1.0-1.5 g/kg). In control cats (10), spontaneous afferent impulses were usually absent or slight in nerves of the small intestine. In sensitized animals (1.5 ml of horse serum given s.c. 4 times with a 1-2 day interval between each admin.) a pronounced spontaneous activity was noted in the form of slow fluctuations (with an amplitude up to 20 µVolts) and rapid oscillations of 1-2 msec. duration (an amplitude of 30-40 µ Volts).

nsitized animals were intestinally perfused
Ringer-Locke soln. and the av. threshold
of acetylcholine which increased afferent
ity were 10 μg; addition of horse serum (5
o the perfusion fluid did not alter activity
ensitivity of receptors to acetylcholine re-
d unchanged; impulses were stimulated only
the admin. of 100 μg or more of acetylcholine
e systemic circulation. Reaction of recep-
was absent upon i.v. admin. of horse serum,
heir sensitivity to the subsequent admin.
etylcholine remained unchanged. In the
tized cats the threshold doses of acetyl-
ne which stimulated receptors during admin.
the perfused intestine decreased to 0.1
The admin. of horse serum with the perfusion
stimulated activity. Horse serum decreased
itivity of the intestinal receptors to acetyl-
ine more than 100-fold, and the av. threshold
s of acetylcholine admin. into the systemic
ulations were 100 μg. Horse serum admin.
stimulated afferent activity after excit-
ity of the intestinal receptors decreased
tylcholine threshold doses increased to
1000 μg). Electrophysiological study of the
tional status of the small intestinal recep-
showed that, in animals sensitized by
ated admin. of heterogenic horse serum pro-
, the receptor excitability was markedly
er than in controls. These data suggest a
ible participation of interoceptors of the
l intestine in the sensitization of the
nism and in the mechanism of anaphylactic
k.

CHANGES IN GLUCOSE METABOLISM IN THE RAT
INTESTINE THROUGH ADAPTATION TO A PRO-
-RICH DIET. (Ger.) Scharrer, E. (Harvard
Boston, Mass.), K. Müller and H. Zucker.
e Seyler. Z. Physiol. Chem. 348(6):720-722, 1967.

ose metabolism was monitored in rats which
been adapted to a high-protein (74%) diet,
in rats adapted to a low-protein (11%) diet;
protein in these diets was methionine-enriched
ein; oil, minerals, and vitamins as well as
ohydrate were in the diet. The animals were
the 2 different diets for an adaptation period
3 wk. After a 24-hr. fast the animals each
eived 3 g of high-protein diet. The blood
ar levels were measured every 1 or 2 hr. for
hr. in the blood from the abdominal aorta,
portal vein, and the inferior vena cava. The
y significant difference occurred between the
cose levels in the aorta and portal vein of
group adapted to a high-protein diet compared
the difference of the group adapted to a low-
tein diet. The blood sugar level in the portal
n of the protein-adapted animals was high,
icating reduced glucose utilization by
estinal tissue following protein adaptation.
dy of isolated small intestine confirms this.

2 TISSUE ANTIGENS OF THE DIGESTIVE TRACT
IN MAN AND ANIMALS. I. ANTIGENS
ATED TO THE AGGLUTINOGENS OF A BLOOD GROUP.
.) Zweibaum, A. (Broussais Hosp., Paris), B.
pern, C. Veyre and R. Oriol-Palou. Path. Biol.
ris) 15(7-8):349-358, 1967.

Tissues were obtained from the various regions of the digestive tracts of rats, normal and germ-free, from fetal animals by cesarian section between 18-21 days of gestation, as well as from dogs, rabbits, monkeys, guinea pigs, pigs; horses, cattle, sheep and cats. Specimens of human mucosa were obtained at operation and at autopsy. All tissues were immediately frozen in liquid nitrogen. Human sera of 400 subjects representing the 4 international blood groups were provided from normal donor blood. Immune sera were developed in rabbits. Controls and proofs of absorption were used throughout these studies. Fluorescent immune sera for the indirect technic of Coons were developed using rabbit immune sera with a modification of technic giving constant results of complete specificity. Colonic mucosa (obtained from an animal with the demonstrable antigen) was inj. into rabbits or rats; the immune sera, with a very high titer of specific agglutinins against human group A agglutinogen, were developed and used with the Coons' method and Goldstein's technic. The mucous glands of the colon of some species of animals (all except the guinea pig and the horse) had an antigen immunologically related to, or identical with, the human A agglutinogen of RBC. The agglutinogen is not of bacterial origin as was proved in germ-free animals and by fetuses. It is different from the Forssman heterophil antigen. It was found in the gland cells of the digestive tract but not in the RBC. Immune sera against the colonic mucosa from an animal with the antigen had high specific titers of specific agglutinins against human group A RBC, confirming the close immunologic relationship between the antigens of the mucous glands and the Group A human RBC. In the rat, dog, cat rabbit, monkey and sheep the A-agglutinogen was mainly confined to the glands of the colon, but was occasionally demonstrated in the small intestinal glands. It was never found in the prepyloric region of the tract in these animals. However, in the ox, horse, swine and man (Group A) the agglutinogen was constantly present in the prepyloric part of the digestive tract and more rarely, except in the pig, in the ileum and colon. With respect to the A agglutinogen these mammals can be divided into gastric and colonic secretors.

7713 TISSUE ANTIGENS OF THE DIGESTIVE TRACT IN MAN AND ANIMALS. 2. THE ANTIGENS OF THE COLON. (Fr.) Zweibaum, A. (Broussais Hosp., Paris), B. Halpern, C. Veyre and R. Oriol-Palou. Path. Biol. (Paris) 15(7-8):359-367, 1967.

The same material and methods used in the previous paper have been used in these studies. The immuno-fluorescent method of Coons with Goldstein's technic were the main investigative technics. Direct methods were sometimes insufficiently sensitive. Specific details of the methods are given. The immunological nature of the antigens present in the mammalian colon was studied by immunizing animals with homologous and heterologous colonic mucosa and by investigating the nature and specificity of the antibodies thus obtained. Qualitative and quantitative studies of immune sera obtained by the use of colonic mucosa of 10 species of animals, including man, demonstrated 3 specific kinds of colonic antigens: (1) species-specific anticolonic antibodies; (2) organ-specific antibodies common for all mammals; (3) antibodies specific for an antigen related to human blood group A agglutinogen, present in the colon of certain species of animals only (previous paper). Immunization with homologous colonic mucosa never caused formation of anticolonic antibodies. Immunization with heterologous colonic mucosa produced antibodies which were fixed not only by heterologous colons but also by the immunized animal's own colon. A hypothesis is advanced that the interspecific cross reactions are probably caused by antigens of mucopolysaccharide type which exhibit very similar immunologic relationships.

7714 VITAMIN D STIMULATION OF [^{3}H]-OROTIC ACID INCORPORATION INTO RIBONUCLEIC ACID OF RAT INTESTINAL MUCOSA. (E.) Stohs, S. J. (U. Wisconsin, Madison), J. E. Zull and H. F. DeLuca. Biochemistry (Wash.) 6(5):1304-1310, 1967.

Male weanling rats were fed a diet adequate in Ca (0.47%) and P (0.3%), and given fat-soluble vitamins p.o. thrice weekly; the rats were vitamin D-deficient after 3-4 wk., as shown by reduced growth and lowered serum Ca levels. In experiments in which rachitic rats were used, male weanlings were maintained for at least 3 wk. on a high Ca:P ratio diet. Two vitamin D-deficient rats, fasted 12-14 hr., were given either 2,000 International U of vitamin D$_3$ i.p. in 0.5 ml of aqueous soln. containing 0.9% NaCl and 0.1% Tween 40 or 10 International U intrajugularly in 0.04 ml of 95% ethanol. Two deficient animals were used as controls and were given the appropriate soln. without the vitamin. All rats were given 50 μC of [^{3}H]-orotic acid 1 hr. before sacrifice. Several animals were admin. 100 μg of actinomycin D (i.p., in 0.5 ml of freshly prepared H_2O-ethanol (9:1) soln.) 2 hr. before admin. of vitamin D$_3$ or control soln. and were sacrificed 5 hr. later. There was a 2-3-fold stimulation of [^{3}H]-orotic acid incorporation into the RNA of intestinal mucosa within 3 hr. after admin. of vitamin D$_3$; max. response occurred at 3-5 hr. By 8 hr. after vitamin D$_3$ admin., no effect of the vitamin on RNA synthesis was observed. A stimulation of [^{3}H]-orotic acid incorporation into RNA occurred also after a 10-U intrajugular inj. of vitamin D$_3$, but a much longer lag-period was noted. One hr. after a dose of [^{3}H]-orotic acid and 3 hr. after 2,000 U of vitamin D$_3$, an increase in RNA labeling of microsomes and cytoplasm, but not mitochondria, occurred. [^{3}H]-Orotic acid was incorporated into the pyrimidine moieties of RNA. Vitamin D$_3$ stimulation of RNA synthesis was also observed in rats fed a high Ca rachitogenic diet. Actinomycin D completely blocked vitamin D$_3$ stimulation of RNA synthesis. RNA labeling was also stimulate by vitamin D in liver and kidneys, but to a muc smaller degree. It is concluded that the physi gic expression of vitamin D action involves tra lation of genetic information through RNA to functional components.

7715 PHYSIOLOGY OF THE SMALL INTESTINE. (E.)(Rev.) Jordan, P. H., Jr. (Baylo Univ. Coll. Med., Houston, Tex.). Surg. Gynec. Obstet. 124(6):1331-1338, 1967.

7716 EFFECTS OF THYROID STATUS AND ADRENER BLOCKING DRUGS ON ISOPROTERENOL-INDUC ENLARGEMENT OF THE SALIVARY GLANDS. (E.) Bray G. A. (Tufts U. Sch. Med., Boston, Mass.). Proc. Soc. Exp. Biol. Med. 124(4):1073-1076, 19

7717 EFFECT OF ESTROGEN, THYROXIN, AND THE COMBINATION ON DENTAL CARIES AND SALIVARY GLANDS IN OVARIECTOMIZED AND INTACT FEMALE RATS. (E.) Liu, F. T. Y. (U. Pittsburg Pa.). J. Dent. Res. 46(3):471-477, 1967.

7718 N- AND C-TERMINAL AMINO ACIDS OF SALI PAROTIN A. (E.) Shimasaki, H. (U. Tokyo), Y. Kubota and Y. Ito. Endocr. Jap. 14(11-16, 1967.

7719 A NEW EFFECT OF RESERPINE: ACCUMULATION OF GLYCOPROTEIN IN THE SUBMAXILLARY GLAND. (E.) Taylor, P. W., Jr. (NIH, Bethesda, Md.), K. C. Richardson, P. M. Roddy and E. Titus. J. Pharmacol. Exp. Ther. 156(3):483-491, 1967.

7720 ALBUMIN TRANSFER FROM BLOOD TO SMALL INTESTINE IN DOGS DURING EXSANGUINATIC HYPOTENSION. (E.) Glenert, J. (U. Copenhagen) and S. N. Pedersen. Acta Chir. Scand. 133(2): 95-106, 1967.

7721 REFLEX INFLUENCES FROM UPPER DIGESTIVE TRACT ON CIRCULATION AND RESPIRATION. (Rus.) Kozenko, T. M. (Med. Inst., Dniepropetro USSR). Fiziol. Zh. SSSR Sechenov 53(5):571-574, 1967.

7722 DEMONSTRATION OF HUMAN REAGIN IN MONKE TISSUES. III. IN VITRO PASSIVE SENSITIZATION OF MONKEY ILEUM WITH SERA OF ATOPI PATIENTS. PHYSIOLOGIC AND ENHANCING EXPERIMENTS (E.) Kobayashi, S. (State U. New York, Buffalo) J. P. Girard and C. E. Arbesman. J. Allerg. 40(1):26-45, 1967.

LOCALIZATION OF LYSOZYME ACTIVITY IN A PANETH CELL GRANULE FRACTION. (E.)

, R. J. (Univ. Hosp. St. Rafael, Louvain,
um), G. R. Vantrappen and M. M. Parein.
im. Biophys. Acta 139(1):204-207, 1967.

id increase in lysozyme was observed in small
tinal fluid of mice and cats after admin. of
arpine. Because of the analogy of histo-
cally determined characteristics of the
h cell granule content and lysozyme, it was
ed that the Paneth cell granule contains the
e. Homogenates of mouse and cat small
tine mucosa were fractionated by differential
ifugation. A Paneth cell granule rich frac-
containing a max. of lysozyme activity was
ted from mice, but not cats. Paneth cells
resent in mice, not in cats. Mucosa-free
intestine segments from mice and cats were
enated in sucrose and centrifuged for 450
tion 1), 12,000 (2), 47,200 (3), 180,000
4.5 x 10^6(g x min) (5) and the supernatant
Half of Fraction 2 was purified on an ion-
nge resin and the eluate centrifuged for
0 g (purified Fraction 2). Histological
ons and sedimented subcellular fractions were
ed with hematoxylin-eosin and Gram stains for
scopic examination. Granules with morpho-
al and stain characteristics of Paneth cell
les were mainly in Fraction 2, somewhat in
the mouse. Analysis of DNA, RNA, protein,
yme, monoamine oxidase, β-glucuronidase, acid
hatase and alkaline phosphatase showed Paneth
granules only in 2. A peak of lysozyme
ity was found in 2, and to a lesser extent
Specific activity of lysozyme in purified
ion 2 was 3 times that in unpurified Fraction
raction 5 did not show this change on treat-
Osmotic shock showed that, in a hypotonic
m, lysozyme was released from 2 but not 5.
ts suggest that lysozyme is specific to
ion 2 and is probably found in the Paneth
granules. Lysozyme in 5 may be due to
rostatic binding to microsomes. Lysozyme
ity was low or absent in cat fractions.

SULFATE-CONTAINING MUCOSUBSTANCES OF DOG GASTRIC MUCOSA. (E.)

Spicer, S. S.
, Bethesda, Md.), T. J. Leppi and J. G.
on. Lab. Invest. 16(5):795-802, 1967.

radiography following inj. of $^{35}SO_4$ visualized
ope incorporation in the foveolar and pyloric
dular epithelia and in the zymogenic cells of
dog stomach. The distribution of autoradio-
hic label with radiosulfate correlated precisely
that of histochemical staining indicative of
ated mucosubstances. Basophilia indicative
onsulfated acid mucosubstance in the mucosal
s closest to the lumen, and of neutral muco-
tance in mucous neck and parietal cells,
esponded with absence of autoradiographic
ence for isotope incorporation in these sites.
Digestion with bovine testicular hyaluronidase partially eliminated basophilia of the sulfated mucosubstance in the chief cells and cardiac glands and abolished that of the sulfomucin in the pyloric glands. Hyaluronidase did not, however, alter basophilia of the surface epithelium and had no effect on the strong periodic acid-Schiff reactivity of secretion in the pyloric glands. The basophilia of all dog gastric mucins is eliminated by a 4-hr. 60° C methylation.

7725 INFLUENCE OF IMMUNOSYMPATHECTOMY ON BOWEL ARGENTAFFIN CELLS. (E.)

Thompson, J. H. (U. California Sch. Med., Los Angeles). Arch. Path. (Chicago) 83(5):415-418, 1967.

Swiss-Webster white mice were divided into three groups. Group 1 (5 males, 3 females) was inj. s.c. on the first 6 days of life with 0.02 ml nerve growth factor antiserum/g body wt. and thereby immunosympathectomized; Group 2 (4 males, 4 females) was handled but no inj. was made; and Group 3 (9 males, 5 females) served as normal controls. After sacrifice (which was always done between 8-9 A.M. on the day of study to minimize circadian differences in intestinal serotonin levels or argentaffin cell granulation), the conc. of argentaffin cells in gastrointestinal mucosa was determined for the esophagus, gastric fundus, body and pyloric antrum, upper and lower duodenum, midjejunum, middle and terminal ileum (last half inch), appendix (cecal tip), ascending and descending colon and proximal rectum. There was no significant difference between the cell count per 100 intestinal crypts, or gastric pits in comparable tissues. It is suggested that the increased conc. of serotonin in some areas of the mouse intestine after immunosympathectomy (previously reported) may be due to an increased level of the amine per cell, rather than an increase in the population of argentaffin cells.

7726 PERFUSION AND IMMERSION FIXATION OF RAT LIVER WITH GLUTARALDEHYDE. (E.)

Fahimi, H. D. (Free U., Brussels). Lab. Invest. 16(5):736-750, 1967.

The fixation of rat (male, Sprague-Dawley) liver by immersion and perfusion with glutaraldehyde was studied. Immersion fixation in the conventional manner for 3 hr. in 2.5% glutaraldehyde in phosphate buffer fixed only a thin rim of 5-10 cell layers at the periphery of the tissue block. Direct perfusion of the same glutaraldehyde fixative through the portal vein often resulted in thrombosis of branches of the portal vein and poor perfusion fixation. There was significant improvement when brief perfusion of heparinized saline preceded perfusion of the fixative through the portal system. However, it was found that perfusion of the fixative through the portal vein followed by perfusion through the hepatic vein yielded the best results in a large percentage of animals. It is concluded that, considering that a 10- to 15-min. fixation appeared to be sufficient, the perfusion fixation of rat liver may be useful for future ultrastructural, cytochemical and biochemical studies.

7727 STRUCTURE OF THE COMMON BILE DUCT IN MAN: PRESENCE OR ABSENCE OF SMOOTH MUSCLE. (E.) Mahour, G. H. (Mayo Clin., Rochester, Minn.), K. G. Wakim, E. H. Soule and D. O. Ferris. Ann. Surg. 166(1):91-94, 1967.

A survey of the medical literature has revealed varied descriptions concerning the structure of the common bile duct in man; the presence or absence of the smooth muscle in the duct and its function with regard to the passage of bile have been debatable. Common bile ducts were removed at postmortem examination from 100 selected subjects (13-94 yr. old), each of whom had a normal hepatobiliary duct system. Histological examination revealed that 88% had no smooth muscle fibers at all in the duct wall, whereas the remaining 12% had smooth muscle clearly demonstrated in the wall of the duct. Quantity of smooth muscle fibers varied among specimens, but except for 1 specimen, such fibers were always observed in sections from both the distal and the proximal segments. One duct showed muscle fibers in the section from the distal part but no muscle fibers in the proximal portion. The muscle fibers were always sparse and interdigitated with the collagenous and elastic fibers. There was no relationship between the age of the subject and the presence or absence of smooth muscles in the structure of the ducts, nor did the distal segment exhibit more muscle than did the proximal one.

7728 EARLY EMBRYOGENESIS OF THE LIVER. ELECTRON MICROSCOPE STUDIES ON EMBRYONIC RAT LIVER. (Ger.) Spycher, M. A. (U. Zurich). Path. Microbiol. (Basel) 30(3):303-352, 1967.

7729 ULTRASTRUCTURAL CHANGES IN THE DEVELOPING CHICK LIVER. I. GENERAL CYTOLOGY. (E.) Stephens, R. J. (U. Southern California, Los Angeles) and R. F. Bils. J. Ultrastruct. Res. 18(3-4):456-474, 1967.

7730 SERIAL SECTION ANALYSIS OF MITOCHONDRIAL FORM AND MEMBRANE RELATIONSHIPS IN THE NEONATAL RAT LIVER CELL. (E.) Stempak, J. (State U. New York Downstate Med. Ctr., Brooklyn). J. Ultrastruct. Res. 18(5-6):619-636, 1967.

7731 AUTOFLUORESCENCE OF LYSOZYMES IN HEPATOCYTES AND EPITHELIAL CELLS OF THE RENAL TUBULE. (Fr.) Zaccheo, D. and C. E. Gr
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Boll. Soc. Ital. Biol. Sper. 43(2):78-79, 1967

7733 THE MORPHOGENESIS OF THE PANCREAS IN
THE CHICKEN. (Jap.) Ono, K. (Iwate
Morioka, Japan). Kaibogaku Zasshi (Acta Anat.
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7734 VITAL HISTOLOGY OF THE PANCREAS. (G
Heisig, N. (U. Clin. Hamburg-Eppendo
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7735 TOPOGRAPHIC-ANATOMICAL RELATIONSHIPS
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Vestn. Khir. Grekov 98(5):28-34, 1967.

7736 SPINAL INNERVATION OF DUODENUM. (EX
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Zlatitskaia, N. N. (Kirov Order of Lenin Med.
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1967.

7737 CELL PROLIFERATION AND DIFFERENTIATI
IN THE SQUAMOUS EPITHELIUM OF THE FO
STOMACH OF THE MOUSE. (E.) Frankfurt, O. S.
(Inst. Physical Chem., Moscow). Exp. Cell Res.
46(3):603-606, 1967.

7738 PROPER BLOOD VESSELS OF THE MESENTERY
(Rus.) Varlamov, V. I. (Pirogov Odessa Med. Inst., USSR). Arkh. Anat. 52(6): 53-56, 1967.

7739 ANATOMICAL-TOPOGRAPHIC APPEARANCE OF THE ABDOMINAL AORTA AND ITS LARGE BRANCHES WITH REGARD TO CATHETERIZATION AND SELECTIVE ANGIOGRAPHY DURING LIFE. (Rus.) Kulieva, K. D. (Cent. Inst. Postgrad. Med., Moscow). Vestn. Khir. Grekov 98(6):77-80, 1967

7740 ELECTRON MICROSCOPE STUDIES ON THE ESOPHAGEAL BASAL MEMBRANE IN PIKE. (Ger.) Linss, W. (Friedrich Schiller U., Jena, Germany) and G. Geyer. Anat. Anz. 120(4):337-342, 1967.

See also abstract nos.: 7826,7848

ABSORPTION OF EXOGENOUS AND ENDOGENOUS BILIARY COPPER IN THE RAT.

(E.)
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received 0.5-1000 μg ^{64}Cu as cupric acetate
oper (II-ethylenediaminetetraacetic acid)
killed after 24 hr., the entire gastro-
tinal tract resected and the total radio-
ity remaining in the carcass, liver and
used as an index of absorption. For ab-
ion of biliary Cu, bile was first obtained
gh an external biliary fistula from rats
ously admin. 100 μg Cu i.v. Known amounts
in the biliary fractions taken at 0-4, 4-8
-24 hr. (both dialyzed and undialyzed) were
intrapylorically and absorption determined
24 hr. Absorption of 2.5 μg ceruloplasmin
rom donor rats) was also determined. About
f Cu was retained when cupric acetate was
. at 0.5-10.0 μg. Absorption decreased
increasing dose, and was 10% at 200-1000 μg.
ar results were obtained with the other Cu
und. With inj. of biliary Cu at 0.5-10.0 μg,
% was absorbed in 24 hr. At a constant dose
5 μg endogenous undialyzed biliary Cu, ab-
ion decreased progressively when the frac-
of bile taken at later times were inj.
of absorption for 0-4 hr. fraction, 9% for
hr.). After ceruloplasmin, approx. 10% of
was retained. The poor absorption of
enous Cu is contrasted with the far greater
ption of exogenous Cu. The differing degree
sorption with a constant amount of biliary
ggests a change in the Cu-protein complex
increasing time after i.v. admin. The re-
might explain the zero Cu balance in man
te a relatively high intake of dietary Cu.
sive exogenous Cu is poorly absorbed. Sub-
nt biliary excretion and poor reabsorption
, i.e. lack of significant enterohepatic
lation, may represent the chief pathway for
limination of Cu from the body.

THE ABSORPTION OF CALCIUM CARBONATE.

(E.) Ivanovich, P. (U. Washington
Med., Seattle), H. Fellows and C. Rich.
Intern. *Med*. 66(5):917-923, 1967.

ngle dose of 1-12 g of $CaCo_3$ given to normal
ing subjects caused a transient rise of blood
onc., often to low hypercalcemic values;
rise was greater and more prolonged after the
er doses. In order to evaluate directly the
rption of this salt of Ca, 2 g of $CaCO_3$
led with ^{45}Ca were admin. p.o. to fasted sub-
s; all patients had normal blood Ca values
he time this test was done. Five control
ects absorbed 9-18% of the dose, while 5
ents with acute milk-alkali syndrome absorbed
een 12-37% of the dose. A third group of
patients, found to have no free acid, absorbed little or no $^{45}CaCO_3$. One of these patients admin. 50 mg betazole s.c. 45 min. before $^{45}CaCO_3$ was given for a second measurement of absorption; as compared to the first test, gastric pH dropped from 6.5 to 1.0, acid conc. rose from 14 to 110 mEq/liter and the absorption of $^{45}CaCO_3$ rose from 2 to 10%. A control subject, similarly stimulated, showed a probably significant but less marked increase in absorption from 15 to 19% of dose. From this it was concluded that gastric acid must be present to dissolve the $CaCO_3$ before it can be absorbed. The percent absorption of 10, 200 and 500 mg Ca, given as Ca gluconate to subjects with normal Ca metabolism and gastrointestinal function, was 67.5 ± 24.3, 24.6 ± 8.7 and 21.8 ± 4.3, resp.; the 2 g dose of $^{45}CaCO_3$ contained 800 mg Ca, and its absorption was 16.6 ± 8.5%. These results show that $CaCO_3$ is as well, or almost as well, absorbed as calcium gluconate and support clinical evidence that treatment with $CaCO_3$ leads to hypercalcemia in some patients and ultimately, in a few, to irreversible renal damage and Burnett's syndrome. The only subjects who failed to absorb $CaCO_3$ were patients who were found not to secrete free acid in their gastric juices.

7743 INTESTINAL TRANSPORT OF CALCIUM AND PHOSPHATE IN EXPERIMENTAL MAGNESIUM DEFICIENCY.

(E.) Lifshitz, F. (Johns Hopkins U. Sch. Med., Baltimore, Md.), H. C. Harrison and H. E. Harrison. *Proc*. *Soc*. *Exp*. *Biol*. *Med*. 125(1):19-25, 1967.

Male weanling Sprague-Dawley rats (of dams which were deprived of vitamin D during lactation) were divided into 4 groups: a control and a Mg-deficient group from both vitamin-D-treated and vitamin D-deficient animals. All rats were fed a vitamin-D free diet that differed only in the Mg content (controls, 0.397 mg/g of diet; Mg-deficient, 0.022 mg/g of diet). In addition, the vitamin-D-treated animals received 100 or 1000 I.U. of vitamin D_2 in a single dose p.o. given weekly. The concentrative transport of Ca by everted intestinal loops *in vitro* and the permeability of the small intestinal wall to this ion were determined in intestinal preparations from these rats. Results of these experiments indicated that concentrative transport of Ca by rat small intestine *in vitro* was altered by the presence or absence of Mg in the medium, but not by Mg depletion of the animals. Permeability to Ca of the intestinal preparations was not influenced by Mg deficiency. The effects of Mg depletion of the rat and of the presence of Mg in the medium on concentrative transport of inorganic phosphate by the small intestine *in vitro* were also investigated. Concentrative transport of phosphate by intestinal loops incubated in Mg-containing buffer was less than that by those incubated in Mg-free buffer. Intestinal loop preparations from Mg-deficient rats transferred phosphate to a greater extent than those obtained from control rats; this difference was observed both in the presence and absence of Mg in the buffer soln. Mg deficiency in the rat also reduced the conc. of serum P and increased the excretion of phosphate in the urine. These results are consistent with the hypothesis that Mg influences the phosphate transport systems which control phosphate conc. in extracellular fluids.

7744 VITAMIN D-INDUCED CALCIUM BINDING FACTOR IN RAT INTESTINAL MUCOSA. (E.) Kallfelz, F. A. (New York State Vet. Coll., Ithaca), A. N. Taylor and R. H. Wasserman. Proc. Soc. Exp. Biol. Med. 125(1):54-58, 1967.

Male Sprague-Dawley rats (100 g) were fed a rachitogenic diet consisting of 50% cornstarch, 20% dextrose, 15% alcohol-extracted blood fibrin, 4% brewers yeast, 3% $CaCO_3$, 7% vitamin A palmitate in corn oil (100 I.U./ml) and 1% salt mixture; the latter contained 50% iodized NaCl, 44% KCl, 2% ferric phosphate, 1.7% manganese sulfate (dried), 2% magnesium carbonate and 0.3% cupric sulfate (anhydrous). The Ca and P conc. of the diet were 1.17% and 0.07%, resp. After 4 wk. of this diet, the rats had gross and histological evidence of rickets, and responded to vitamin D treatment with a rise in blood Ca, remission of rickets and an increase in intestinal absorption of Ca. Approx. 72 hr. before the experiment, 10 animals were given vitamin D_3 (500 I.U., p.o.) in 1 ml of a vegetable oil carrier and another 10 rats were given 500 I.U. of vitamin D_2. The p.o. admin. of vitamin D_2 or D_3 resulted in the elaboration of a Ca-binding factor which could be detected in the supernatant fraction of duodenal mucosal homogenates at 72 hr. after admin. of the vitamin. This factor was associated with the initial or protein-containing portion of the supernatants after percolation through Sephadex G-25, thereby indicating that the factor is a macromolecule, presumably a protein. Further separation of the supernatants by Sephadex G-100 gel filtration showed that the increased binding activity seen after vitamin D admin. was principally associated with only 1 of the protein peaks present in the Sephadex G-100 fractions. This particular peak was much less prominent in the fractionated supernatant of the mucosal homogenates from rachitic rats. It is concluded that the vitamin D-dependent binding activity is due to the presence of a specific Ca-binding protein in the supernatant fraction of duodenal mucosal homogenates from vitamin D-treated rachitic rats.

7745 THE ESSENTIAL ROLE OF BILE IN THE INTESTINAL ABSORPTION OF CHOLESTEROL. (E.) Buchwald, H. (U. Minnesota Med. Sch., Minneapolis) and R. L. Gebhard. Surgery 61(5): 791-794, 1967.

The absence of bile from the intact intestinal tract of the rabbit leads to essentially complete absence of cholesterol absorption. Th role of bile in the absorption of cholesterol from the intestinal tract was observed in bilia fistula rabbits, comparison being made with nor animals acting as controls. Cholesterol absorption was measured by whole-blood cholesterol radioactivity and cholesterol-specific activity subsequent to a standard intragastric dose of cholesterol-4-^{14}C. The av. 6-day whole blood values of controls were 2458 counts/min./ml.; specific activity values were 2735 counts/min./ External biliary-fistula rabbits gave values of 8.5 counts/min./ml. for whole blood and 10 counts/min./mg for specific activity.

7746 EFFECT OF SODIUM DEHYDROCHOLATE ON THE INTESTINAL ABSORPTION OF BILIRUBI IN THE RAT. (Ger.) Lücking, T. (U. Child. Cli Freiburg i. Br., Germany) and W. Künzer. Klin. Wschr. 45(10):547-548, 1967.

The absorption of bilirubin from the small intestine was tested by intraduodenal inj. of 250 mg/kg of bilirubin dissolved in 0.1 N Na_2CO_3 or suspended in distilled water in white rats (160 No appreciable absorption occurred. This was also true when the bilirubin was dissolved in 1 or 32 mM Na-dehydrocholate. Beginning with a conc. of 64 mM Na-dehydrocholate as a solvent for the bilirubin and continuing through increa ing conc. of the bile salt (128, 256, and 512 m the rate of absorption increased with increased Na-dehydrocholate conc. This was proved by dete mining the serum conc. 1 and 3 hr. after intradu denal inj. of bilirubin. After 1 hr. serum bilirubin at 64 mM bile salt conc. was 0.2 mg, 0.5 mg% at 128 mM, 0.8 mg% at 256 mM, and 1.5 mg% at 512 mM. The effect at 3 hr. was similar, but serum conc. was less. The same experimental sequence was repeated in 2-3-wk.-old rats (18 g) In no case, with or without bile salt, was there any absorption of bilirubin from the small intestine in the young rats. Na-dehydrocholate in higher conc. than 512 mM had no effect.

7747 METHODS FOR THE STUDY OF ABSORPTIVE PATHWAYS IN THE INTESTINE OF CONSCIOUS ANIMALS. (Ger.) Aziz, O. (Free U., Berlin-Dahl Germany), R. Herzer and F. J. Haberich. Naturwissenschaften 54(7):172-173, 1967.

A method is described for the study of absorptio in the intestine of the conscious animal, obviat the unphysiologic conditions presented by the Thiry-Vella, Cori and Pavlov preparations. This method consists in isolating a sufficiently long section of intestine by special clamps and perfusing the section through input and output

as introduced through the intestinal wall.
the end of the test the clamps and the can-
can be removed and the normal passageway
ed. The clamps consist of cuffs of silicone-
tubing which can be filled and pumped up
water through a side tube from the outside;
lamping is smooth, uniform and precise and
e applied without interrupting the blood
The perfusing fluid flows into a graduated
and is then recirculated through the intes-
by means of a peristaltic pump. Samples
e withdrawn from a conveniently-located
e. Vol. changes in the system can be meas-
altered and adjusted. The vol. flow can
asured and adjusted. A graph is presented
ng vol. changes in the perfusion system in
nse to perfusion of the intestinal section
2 hypertonic, 1 isotonic, and 2 hypotonic
, singly 1 after another; all showed very
y rectilinear relationships with flow from
lood to the intestinal lumen in the first
most a net zero vol. flow in the case of
sotonic soln. and a flow from the intestinal
into the blood stream for the hypotonic
The soln. were, 1.8, 1.2, 0.9, 0.45% NaCl
ater.

STUDIES ON THE ABSORPTION AND UTILIZATION OF VARIOUS DIETARY PROTEINS.
9. (Ger.) Miller, B. (U. Marburg/Lahn,
ny), H. G. Knauff and G. Mayer. Verh.
ch. Ges. Inn. Med. 72:703-706, 1967.

a 12-hr. fast the subjects were each given
rotein/kg body wt., consisting (for a person
kg) of 350 g of veal, 420 g of fish or
of powdered milk; meat and fish were grilled
eir own juices and eaten with no other ad-
n than vegetables and 10 g of fat. The
red milk was taken suspended in water. Some
acids (aspartic acid, histidine, leucine,
e, methionine, phenylalanine, serine, threo-
and valine) were present in about the same
ities in the food proteins investigated;
amino acids show considerable differences
roteins of meat, fish and milk. However,
factors also modify the rates at which amino
appear in the peripheral blood plasma, e.g.
e conc., rate of absorption of the amino
and the absorption and rate of utilization
ecific amino acids by cells of the body in
ral and also cells of some organs. Most
acids showed an increase of 100% with a
after 3 hr. The fasting conc. was not
ed until after 4-5 hr. The peripheral peaks
glycine for meat, fish and milk all reached
max. in about 2 hr., between 2-3 hr. for
sine, in about 2 hr. for taurine and in 3 hr.
arginine of meat and fish but not until
4 hr. for arginine of milk. Total α-amino
nitrogen for the 3 proteins reached a max.
hr. in normal subjects. In subjects with
cirrhosis the total α-amino nitrogen
ed about half the normal peak value at 4 hr.
the conc. still rising. The reasons for
total α-nitrogen differences are unknown. The
e of individual differences was large.

7749 THE INTESTINAL ABSOPPTION OF PIG AND BOVINE IMMUNE LACTOGLOBULIN AND HUMAN SERUM ALBUMIN BY THE NEW-BORN PIG. (E.) Pierce, A. E. (A.R.C. Inst. Animal Physiol. Babraham, Cambridge, England) and M. W. Smith. J. Physiol. (London) 190(1):1-18, 1967.

A quantitative immunodiffusion assay was made of protein absorption in newborn pigs to determine the immune globulins absorbed. Large amounts of homologous and heterologous colostral immune globulins and human serum albumin were fed to newborn pigs; these proteins appeared in the serum in low conc. 45 min. later, then rose rapidly to a high level. When equal amounts were fed, no difference was seen between the amounts absorbed, although there was a wide variation among individual pigs. Admin. of equal conc. of pig and bovine colostral IgG resulted in greater pig IgG absorption than bovine. Human serum albumin was readily absorbed from bovine colostral IgG in bovine colostrum. The pig intestine absorbed bovine colostral IgG in proportion to dosage and/or conc. fed, but remained constant for higher doses. A portion of the absorbed immune globulin existed in a partly degraded form. The digestion of protein and individual pig differences made the results unclear to the investigators. Digestion was extensive, 90% of the initially fed protein never being accounted for. It is suggested that the delay in appearance of ingested protein in the serum when low conc. were fed might mean that an increase in protein conc. in the intestine is needed to initiate pinocytosis.

7750 THE IN VITRO TRANSFER OF BOVINE IMMUNE LACTOGLOBULIN ACROSS THE INTESTINE OF NEW-BORN PIGS. (E.) Pierce, A. E. (A.R.C. Inst. Animal Physiol., Babraham, Cambridge, England) and M. W. Smith. J. Physiol. (London) 190(1):19-34, 1967.

Intestinal segments of newborn pigs were either incubated in, or removed after oral admin. of, bovine colostrum containing a known conc. of immune globulin, some of it dialyzed against bicarbonate saline. The intestine was everted into sacs in order to study protein-transfer mechanisms. Large vol. of protein soln. were presented simultaneously to different parts of the small intestine. Stable conditions were maintained through the incubation. Control experiments were designed to establish the viability of the sacs during a 2-hr. period of incubation. Positive serosal transfer of glucose occurred along the whole length of the small intestine (i.e., all segments prepared from it), with a max. transfer of approx. 60 μmole/g/hr. in the jejunum region. Fluid transfer was held fairly constant until the extreme end of the ileum where transfer was approx. halved, thus showing that transfer of glucose and fluid was not quantitatively related. Transmural potentials were present, with the serosal side positive to the mucosal side. In some cases the IgG molecule appeared to have undergone change in its passage through the intestinal wall. Only for some segments did the total transfer depend upon the amount initially fed. The site of max. transfer varied with the conc. of protein fed. Quantitative IgG transfer was greater for colostrum dialyzed against bicarbonate saline than for undialyzed colostrum. In some segments, the presence of albumin lowered serosal transfer of colostral IgG to values approx. those obtained with undialyzed colostrum. The greatest transfer of human serum albumin occurred in the region of greatest inhibition of immune protein transfer by albumin. Histologic and physicochemical evidence suggest that in vitro preparation can survive incubation. Tiny amounts of immune globulin were transferred in vitro approx. 50 times less than when colostrum was first fed to the pig. More protein transferred in the middle-third of the small intestine where albumin-inhibited ion was also greatest. More than 20 albumin molecules transferred for each molecule of immune globulin. Human serum albumin interfered with IgG transfer. The mechanism of protein transfer in these experiments has shown itself to be capable of differentiating between various proteins. More evidence is needed for understanding selectivity and interference among proteins of varying sizes.

7751 DIFFERENTIAL ABSORPTION OF THE HEME AND GLOBIN MOIETIES OF HEMOGLOBIN. (E.) Tripathy, K. (Valle U., Cali, Colombia), F. T. Garcia, L. G. Mayoral, S. Klahr and J. Ghitis. Amer. J. Dig. Dis. 12(6):577-581, 1967.

Four healthy male medical-student volunteers were placed on a basal diet consisting of 3360 calories, with 65 g protein (30 g of animal origin), 140 g of fat and 360 g of carbohydrate as part of a 9-day study. Samples of blood were withdrawn from each subject, the plasma discarded and the RBC analyzed for hemoglobin and total N conc. On the seventh day of the experiment, each subject ingested his own blood mixed with food. In all subjects, there were similar degrees of high fecal excretion of heme pigment with lower excretion of fecal N, concomitant with high excretions of urinary N and creatinine during the 24 hr. after ingestion of blood. While the per cent excretion of heme varied from 50-81% (mean 68%), the per cent excretion of globin was between 3-30% (mean 12.8%). There was an increase in urinary creatinine in all subjects during the 24 hr. after ingestion of blood. These results suggest that the role of blood loss in the pathogenesis of protein malnutrition in patients with hookworm disease is minimal.

7752 HUMAN ABSORPTION OF HEMOGLOBIN-IRON. (E.) Conrad, M. E. (Walter Reed Army Inst. Res., Washington, D. C.), B. I. Benjamin, H. L. Williams and A. L. Foy. Gastroenterology 53(1):5-10, 1967.

Normal volunteers (3) and cirrhotics (3) with patent portacaval shunts were admin. p.o. dose of hemoglobin (0.7 g) labeled with both 10 μc of ^{59}Fe and 40 μc of ^{51}Cr. Jejunal aspirates, obtained 1.5 hr. later, contained significant quantities of dialyzable heme (12-19%) and sma amounts of nonheme Fe (2%). Duodenal biopsy specimens obtained 90 min. after ingestion of the test dose contained both heme and nonheme ^{59}Fe. Plasma specimens contained only nonheme ^{59}Fe. Observations in cirrhotics showed that the absence of labeled heme in plasma specimen was not caused by rapid sequestration in the liver. More Fe was absorbed from test doses o hemoglobin than from comparable quantities of chemically prepared heme. It is thought that degraded globin increases absorption by bindin coordinating bonds of heme and preventing polymerization. Addition of niacin to test doses of heme decreased polymeric aggregation of hem and increased the absorption of heme-Fe. From these results it was concluded that hemoglobin is absorbed by human subjects selectively depe ing upon body requirements for Fe. Heme is sp from globin within the intestinal lumen and ab sorbed into the duodenal mucosa as an intact metalloporphyrin. Fe is split from heme withi intestinal cells and transferred into the plasn Comparison of human and animal studies suggest that the selective absorption of heme-Fe is regulated either by controlled release of Fe from heme within intestinal cells or by regulation of the quantity of Fe transferred from intestinal cells into the plasma or both.

7753 INFLUENCE OF A FAT-ENRICHED MEAL ON HUMAN SERUM (L-PHENYLALANINE-SENSITI "INTESTINAL" ALKALINE PHOSPHATASE. (E.) Ingl N. I. (Tufts U. Sch. Med., Boston, Mass.), M. Krant and W. H. Fishman. Proc. Soc. Exp. Biol Med. 124(3):699-702, 1967.

Normal subjects (8) were given 1 of 2 standard breakfasts after 11 hr. fasting. Breakfast 1 contained 491 calories, 27.3 g fat, 48.2 g carbohydrate and 13 g protein. Breakfast 2 co tained 1002 calories, 696 g fat, 87.5 g carboh drate, and 6.5 g protein. The meal was ingest 15 min. after a blood specimen was drawn, additional blood samples were taken 1 and 4 hr. la In 2 of 4 subjects eating Breakfast 1, a trans increase of L-phenylalanine-sensitive "intesti alkaline phosphatase isoenzyme appeared in the serum. In 4 of 4 subjects eating Breakfast 2, the rise in the isoenzyme appeared and persist for 4 hr. Individuals differed greatly in the pattern of serum enzyme partition which was exhibited. It is concluded that the elevated to alkaline phosphatase is explained by increment in intestinal alkaline phosphatase, especially in subjects eating Breakfast 2 and this findin is attributed to absorption of fat from the intestine. The individual differences in patter may be related to genetic factors as suggested by ABO blood group studies reported earlier.

INTESTINAL TRANSPORT OF CYSTINE AND
CYSTEINE IN MAN: EVIDENCE FOR SEPARATE
NISMS. (E.) Rosenberg, L. E. (Yale U. Sch.
New Haven, Conn.), J. C. Crawhall and S.
. J. Clin. Invest. 46(1):30-34, 1967.

al of 25 biopsies of jejunal mucosa were
ned with a Rubin tube from 5 normal subjects
patients with documented cystinuria. Each
nuria patient excreted excesses of cystine,
e, arginine, and ornithine in the urine and
ormed renal calculi composed of cystine. The
tinal mucosal specimens were placed in flasks
ining either L-cystine-^{35}S or L-cysteine-^{35}S
ncubated. Transport was determined using
ously described technics. Cystine and
ine were transported by energy-dependent,
ted processes. When either of these amino
was transported, only cysteine was recovered
cellularly, indicating that cystine was re-
to cysteine after achieving an intracellular
ion. In contrast to the findings with
ne, cysteine uptake was not defective in
tine from cystinuric patients, nor did lysine
rginine compete with cysteine for transport.
concluded that cystine and cysteine are
sported by different mechanisms and that only
ystine transport mechanism is defective in
nuria.

INTESTINAL ABSORPTION OF ESSENTIAL
AMINO ACIDS IN MAN. (E.) Adibi, S. A.
sachusetts Inst. Techn., Cambridge) and S. J.
. Gastroenterology 52(5):837-845, 1967.

relative rates and preferential absorption
he 8 essential L-amino acids in the lumen
he human intestine were found as a result of
r admin. in the aggregate form in which these
o acids reach the transport sites of the
r jejunum. Eighteen young adults received
molar mixtures by perfusion at conc. of from
mM and in amounts usually found in a protein
. The *in vivo* perfusion of grouped essential
o acids in man had not been reported prior
his study. The importance of such a deter-
tion is confirmed by the fact that these amino
s assign the nutritive value of a protein and
a fundamental role in human protein metab-
m. The literature reports that each amino
admin. separately is transported at a
acteristic rate, but that this rate may be
red by the presence of other amino acids, sug-
ing competition for the transport site. In
present study the rates of absorption of the
ntial amino acids from the equimolar mixtures
not significantly different until conc. of
were reached. Upward of this conc. the diver-
ce in absorption rates became more pronounced,
gesting an abundance of unoccupied transport
es at the lower conc. A characteristic se-
nce and order of amino acid absorption from
mixture was observed which held constant
each of the constituent amino acids. The
orption rates were most rapid for methionine
the branched amino acids, slowest for
threonine. The intestinal juice of the upper jejunum in the fasting state and after perfusion with isotonic saline contains small amounts of amino acids, leucine and lysine predominating. It is concluded that, in the aggregate, amino acids may inhibit the absorption of others if a common transport system exists. For instance, the absorption rate of threonine perfused in an equimolar mixture containing the other essential amino acids was markedly decreased compared to its absorption rate when perfused alone in identical conc.

7756 THE USE OF THE LOGARITHMIC TRANSFORMATION IN THE CALCULATION OF THE TRANSPORT PARAMETERS OF A SYSTEM THAT OBEYS MICHAELIS-MENTEN KINETICS. (E.) Barber, H. E. (U. Michigan, Ann Arbor), B. L. Welch and D. Mackay. Biochem. J. 103(1):251-255, 1967.

A logarithmic method is described for the calculation of the transport parameters, Michaelis constant (K_m) and the max. initial rate of transport at high substrate conc. ($V_{max.}$), of a biological system obeying Michaelis-Menten kinetics. This logarithmic method allowed the estimation of transport parameters that apparently had not been used previously, allowing separation of variance due to $V_{max.}$ from other variance reducing the fiducial limits that can be placed on an estimation of K_m. The velocity of transport of L-histidine and L-monoiodohistidine at various substrate conc. was studied across the small intestine of cats by using an open sac method based on that described by Crane and Wilson. Estimate of the parameters were made by 2 alternative procedures as well as by the new method. It is concluded that the logarithmic method is generally applicable to systems obeying Michaelis-Menten kinetics. This method is particularly useful when transport rates are measured on different pieces of tissue, since $V_{max.}$ may then be the major source of variance.

7757 RECOVERY, REPRODUCIBILITY, AND USEFULNESS OF POLYETHYLENE GLYCOL, IODINE-LABELLED ROSE BENGAL, SULPHOBROMOPHTHALEIN, AND INDOCYANINE GREEN AS NON-ABSORBABLE MARKERS. (E.) Maddrey, W. C. (Johns Hopkins U. Sch. Med., Baltimore, Md.), H. A. Serebro, H. Marcus and F. L. Iber. Gut 8(2):169-171, 1967.

Nonabsorbable reference markers are needed in investigations of gastrointestinal absorption either to estimate the fluid content of the intestine or to compare the conc. of the markers to that of an unknown. The characteristics of an ideal marker were outlined by Smyth (1961): it can be estimated simply and accurately; it can be estimated in small conc. so that its presence will cause the minimum osmotic disturbance, and it should neither be absorbed from the intestine nor be adherent to protein or mucus. Four mongrel dogs were prepared with Thiry-Vella loops utilizing a 30-cm loop of jejunum together with 4 different markers. Quantitative recovery can be made of all these markers from the intact intestinal loop. Only indocyanine green was recovered incompletely, apparently because it is bound to mucus and therefore its usefulness as a marker was diminished. Over a period of 70 min., sampling of the markers remained valid and their experimental use was reproducible from day to day and from animal to animal. Rose bengal and polyethylene glycol emerged best from these studies, demonstrating complete recovery and low variability. The 2 correlate with one another better than any other pair. Rose bengal produced a smaller effect than polyethylene glycol, and was much easier to analyze.

7758 STUDIES ON THE PERMEABILITY BARRIER TO AMINO-ACID PENETRATION OF THE INTESTINAL MUCOSA DURING INCUBATION _IN VITRO_ IN A Na^+-FREE BUFFER. (E.) Schlenker, J. D. (U. Frankfurt, Germany) and J. W. L. Robinson. _Pflueger_. _Arch_. _Ges_. _Physiol_. 294(2):169-181, 1967.

After incubation of rat intestinal slices _in vitro_ in a soln. of (^{14}C)-L-phenylalanine in Na-free, K-substituted buffer (even of long duration), the mean tissue conc. of the substrate never attained the level of the surrounding medium. The amino acid uptake under such conditions kinetically resembled free diffusion, and was directly proportional to the conc. of the substrate in the incubation medium. It is suggested that there exists a kinetic barrier against the penetration of the amino acid into the mucosal cells of the intestine under such conditions, since the results could not be explained in terms of changes in water content of the tissue during the course of incubation. Existence of this barrier requires intact cellular metabolism, since it was destroyed under anaerobic conditions. When choline instead of K ions were used to substitute for Na, there no longer was a barrier against amino acid entry into the mucosa, but no active transport of L-phenylalanine could take place. By preincubating tissue samples in Na-containing buffer and subsequently incubating them in a Na-free, K-rich, phenylalanine-containing buffer, a transient entry of the substrate into the mucosal tissue was observed; the amino acid later left the tissue again. This finding was attributed to Na ions trapped in the extracellular space close to the mechanisms responsible for amino acid uptake by the epithelial cells, which were able to activate the carrier to permit it to transport the amino acid into the cells. However, when the Na ion conc. within the cells exceeded that of the medium (later in the incubation), Na and amino acid left the cells simultaneously by reversal of the uptake mechanism.

7759 THE LOSS OF INTESTINAL TRANSPORT CAPACITY FOLLOWING PREINCUBATION IN SODIUM-FREE MEDIA _IN VITRO_. (E.) Robinson, J. W. L. (U. Frankfurt, Germany). _Pfleuger_. _Arch_. _Ges_. _Physiol_. 294(2):182-200, 1967.

Preincubation of excised rings of rat intesti in Na-free buffer for 30 min. destroyed the ca ity of the tissue to absorb (^{14}C)-L-phenylala against a conc. gradient during a subsequent cubation in the presence of Na ions. Use of Li or Tris ions as substitutes for Na caused plete loss of transport capacity, but use of choline ions was somewhat less damaging. Pre cubation in a 1:1 mixture of Krebs buffer and Na-free, K-substituted buffer also induced a duction in subsequent transport capacity. The results could not be assigned to lack of metab lizable substrate within the cells when Na was absent from the preincubation medium. They we best explained by suggesting that the Na pump, which is intimately linked with amino acid accumulation within the epithelial cells, was de stroyed during the preincubation period. Then when the tissue was replaced in a Na-containin soln., the cells were flooded with these ions, which may then have been responsible for destr tion of the characteristic properties of the c membrane. Permeation of the tissue with radio active Na after a preincubation in K-rich medi was significantly greater than in control samp as was the penetration of mannitol. This loss of activity after preincubation in the absence of Na ions was partly species-specific; it was present in the rat and the mouse, and absent f the rabbit intestine. (According to the liter it was also absent from the toad and the hamst Since the species from which the effect was absent have intestines possessing ouabain-sens. Na pumps that are involved in non-electrolyte transport, it is suggested that this correlati between sensitivity to Na-free preincubation ar lack of susceptibility to ouabain provides furt evidence for qualitative differences between th Na-pump mechanisms in different animal species.

7760 INTESTINAL TRANSPORT OF SODIUM, POTAS SIUM, AND WATER IN THE DOG DURING SODIUM DEPLETION. (E.) Clarke, A. M. (Western Infirm., Glasgow, Scotland), M. Miller and R. Shields. _Gastroenterology_ 52(5):846-858, 1967.

The absorption of electrolytes from the gut is evidently not as uncontrolled and indiscriminat as has been supposed. The unidirectional trans port of Na, K and water in isolated segments of dog ileum, jejunum and colon were studied befor during and after Na depletion. During depletio the absorption of Na and water, as well as the secretion of K, was seen to increase, particula in the ileum and colon. These changes in the net transport of Na and K were accompanied by appropriate alterations in the rates at which these ions entered the intestinal lumen. Water absorption was increased when the animal was depleted of Na but no marked constant alteration in its unidirectional flow was observed. The intestinal tract did not respond uniformly to Na depletion: absorption of water by the ile and colon was increased during salt depletion whereas in the jejunum there was no detectable alteration. Contrasting with the invariable

se in the secretion of K in the ileum and
the effect of salt depletion upon the
secretion of K was inconsistent. The
segments absorbed Na and water more
than the more distal segments, a phenomenon
both control experiments and during salt
ion. Alterations in intestinal absorption
ctrolytes during Na depletion resembled
resulting from aldosterone admin. Such ef-
could not be blocked by the prior admin. of
olactone. This failure was attributed to
obable high production of aldosterone by
renal cortex of the stressed animal.

ABSORPTION OF VITAMIN B_{12} FROM THE SMALL INTESTINE. STUDY IN MAN, MONKEY, CAT,

G. (E.) Gazet, J. C. (Guy's Hosp.,
) and I. McColl. Brit. J. Surg. 54(2):128-
967.

tion was studied (in surgical patients,
s, cats, dogs) by a modification of the
of McColl and Nissim: at laparotomy a
f proximal jejunum and a loop of distal
were emptied by digital pressure and isolated
oncrushing intestinal clamps; 50-100 ml
saline (37°) was inj. through the wall
he lumen; the loops were reemptied and the
g repeated; to give surface areas of 150
qual lengths of jejunum and ileum, corrected
dth, were measured and clamped off; into
solated and washed intestinal segment a
vol. of 37° normal saline with varying
of radioactive vitamin B_{12} was inj.; either
or ^{58}Co-vitamin B_{12} (specific activity
μc/μg) or ^{22}NaCl (0.1 μc/ml) was used in
of 0.0002-0.011 μg/ml soln., giving 10-
s/5 ml; soln. were withdrawn after 15 min.,
easured, and radioactivity counted. In 3
nd 5 monkeys, the rate of absorption of
nd ^{22}Na was approx. linear over 1 hr., in
he jejunum and ileum. As the percentage
tion of vitamin B_{12} did not increase after
rst 15-min. reading, this period of time
ed for subsequent studies. In a total of
gments studied in 20 patients, 10 monkeys,
, and 36 dogs, little difference was found
n the absorption ability of the jejunum
eum. In humans and cats, the jejunum ab-
more vitamin B_{12} than did the ileum. Ab-
on here was concluded to involve active
ort. There was no statistically significant
rence between jejunum and ileum in the
monkey and dog. These results do not sup-
he contention that vitamin B_{12} can only
sorbed by the ileum by an exclusive mechanism.

BIOSYNTHESIS OF RETINOIC ACID BY INTESTINAL ENZYMES OF THE RAT. (E.)

, F. D. (West Virginia U. Sch. Med.,
ntown), F. J. Lotspeich and R. F. Krause.
pid Res. 8(3):249-254, 1967.

ncubation of β-carotene-^{14}C with the soluble
ion of the intestinal mucosa resulted in
ormation of small amounts of acidic material.
The addition of nicotinamide adenine dinucleotide or reduced nicotinamide adenine dinucleotide to the soluble fraction caused a tenfold increase in this material. Incubation of retinal-15-^{14}C with the soluble fraction of the intestinal mucosa plus nicotinamide adenine dinucleotide or reduced nicotinamide adenine dinucleotide resulted in the conversion of 80-90% of the retinal to acidic material, which has been shown to contain retinoic acid. In vivo studies on the formation of retinoic acid in the intestinal mucosa after the admin. of β-carotene-^{14}C revealed that an appreciable amount of β-carotene was converted to acidic compounds. When retinal-15-^{14}C was admin., portal blood contained 30-40% of the absorbed radioactivity; 24% of this radioactivity was found in acidic material, which has been shown to contain retinoic acid. It is suggested that enzymes in rat intestine cleave β-carotene to retinal and oxidize the latter to retinoic acid, which is then transported by the portal circulation to the liver.

7763 STUDIES ON INTESTINAL ABSORPTION OF CALCIUM AND STRONTIUM IN THE RAT.

(Ger.) Pany, J. E. (U. Vienna). Wien. Klin. Wschr. 79(24):489-492, 1967.

Rats (120-150 g) were anesthetized and an intestinal loop, retaining its normal vascular supply, was constructed; there was only 1 loop/rat, either duodenal-jejunal, 10-12 cm long immediately below the duodenum; the ends of the loop were cannulated and connected in a series circuit having a pump of constant min. vol. output and a reservoir for the perfusate, warmed to 37°C; the open ends from the stomach and to the intestine in situ were tied off. The loop was first perfused with 20 ml of Ringer's soln., then with 20 ml of the test soln. for 1 hr.; the vol. used was always 20 ml and the time of perfusion 1 hr. The test soln. were isotonic bicarbonate Krebs-Ringer's radioactively labeled with 2 μc $^{45}CaCl_2$ or 2 μc $^{90}SrCl_2$; these soln. were used directly or with increased Ca content in the form of an added 300 mg Ca gluconate (28.7 mg Ca) or 200 mg Ca lactate (32.6 mg Ca). In all cases the radioactivity was measured before and after perfusion in a gas flow counting system. After ashing, the radioactivity of the tissue of the loop was measured as activity/mg of ashed tissue. Activity of the blood/100 g of body wt. was also established. Activities of ashed tissue and then of blood perfusing the loop were as follows: with normal Ringer's duodenum 226 (ashed) and 534 (blood), jejunum 1890 (ashed) and 319 (blood); with Ca gluconate duodenum 146 (ashed) and 125 (blood), jejunum 411 (ashed) and 171 (blood); with Ca lactate duodenum 166 (ashed) and 151 (blood), jejunum 667 (ashed) and 151 (blood). The chief effect was the inhibition of absorption apparently due to the gluconate and lactate groups, especially the former. These experiments repeated with radioactive Sr showed the same type of inhibition in a more uniform and pronounced degree. The results from the duodenal loops cannot be compared to those from the jejunal loops because of unspecified differences in length. Moreover, addition of more Ca as lactate or gluconate must have a diluting effect upon the radioactive Ca, as well as an effect upon permeability of the cell.

7764 CYTOCHEMICAL LOCALIZATION OF SOME GLYCOSIDASES AND OTHER ACID HYDROLASES IN THE ABSORPTIVE EPITHELIUM OF THE HUMAN SMALL INTESTINE. (Ger.) Riecken, E. O. (Med. U. Clin., Marburg, Germany), H. A. Schmidt, K. Wächtler and A. G. E. Pearse. *Klin. Wschr.* 45(7):383-387, 1967.

Fresh biopsy tissue was obtained from the mucosa of the jejunum 15 cm below the ligament of Treitz under radiologic control. The tissue was immediately fixed for 12 hr. in formalin-calcium at 4°C, washed in ice cold gum arabic-sugar soln., and finally frozen in liquid nitrogen. Fresh liver tissue and, in some cases, the very enzymatically-active intestine of the snail, *Patella vulgata*, served as control material. The enzymes were identified by well-established technics and the use of precise conc. of inhibitory compounds (such as 5×10^{-2} M phenylalanine on acid phosphatases). The enzymes demonstrated were 1) nonspecific acid phosphatases; 2) nonspecific lysosomal esterases; 3) arylsulfatase C; 4) β-D-glucuronidase; 5) β-D-glucosaminidase; 6) α-D-glucosidase; 7) β-D-galactosidase. Heated sections without substrate were used for technic control. Sections were prepared for the optical microscope and also for the ultramicroscope for fine structural localization of enzymes with a combined histochemical and ultramicroscopic method. The unspecific acid phosphatases, E600-resistant esterase, β-glucuronidase and β-glucosaminidase demonstrated the same localization in human intestinal mucosa and control tissues but with differences in intensity. They were restricted to a narrow zone of granular particles which lay below the brush border. The brush border itself was stained only in the acid phosphatase reaction, and then only lightly. Arylsulfatase C was not demonstrable in human tissue; some weak arylsulfatase C showed up in human macrophages. The cytochemical-ultramicroscopic combined method placed the nonspecific acid phosphatases in the lysosomes. α-Glucosidase and β-galactosidase could not be demonstrated in human tissue on a cytochemical level.

7765 KINETIC STUDY OF THE MODIFICATIONS IN THE ELECTRIC ACTIVITY OF THE SMALL INTESTINE OF THE RAT DURING ABSORPTION OF SUGARS. (Fr.) Rougereau, A. (Fac. Med., Tours, France), C. Janvier and J. Thouvenot. *C. R. Soc. Biol. (Paris)* 160(11):2183-2187, 1966.

The electrical activity of the intestine was recorded using a unipolar suction electrode attached to an intestinal loop (15-cm) long) through which a regular flow of 4.5 ml/hr. of sugar (or other) soln. warmed to 36°C, was maintained by a fractionating pump. The rate of absorption of these compounds, continuously monitored over a period of at least 1 hr. by mear of an autoanalyzer, was correlated with the electrical activity simultaneously recorded. In addition to 22 tests on glucose, the following multiple tests were made on galactose (6), ribose (3), mannose (3), arabinose (3) and sucrose (3), as well as other multiple tests on ATP alone and ATP in conjunction with glucose, ribose, mannose, and xylose; fructose-6-phosphate was tried. A number of different metabolic inhibitors, monoiod acetic acid, 2,4-dinitrophenol, sodium fluoride, phlorhizin, and sodium azide, alone and with glucose, were investigated. The electrical values were given as percentages of the time on the recording; high electrical readings correlate with the high rates of absorption; thus the overall electrical values for galactose and glucose are given as 10.6 and 10, resp., the highest among the sugars; of those tested, these 2 sugars had the most rapid rates of absorption whereas sucrose with no absorption had no electrical response. The electrical variations which were recorded were due to the action currents of smoot muscle. This indicates that the degree of muscular activity influences the rate of absorption. The electrical value of ATP alone was 16.5 ATP and glucose had a value of 12, 2 greater than for glucose alone; the values for other sugars were also increased; the rates of absorption were proportionately increased. In the presence of metabolic inhibitors the electrical values for glucose were abolished in 2 instances and much reduced (to 18% or less) in 3, as were the rates of absorption.

7766 INTERPRETATION OF HEXOSE-DEPENDENT ELECTRICAL POTENTIAL DIFFERENCES IN SMALL INTESTINE. (E.) Schultz, S. G. (Harvard Med. Sch., Boston, Mass.), P. F. Curran and E. M. Wright. *Nature (London)* 214(5087):509-510, 1967.

It is demonstrated mathematically that the hexose dependent increase in the I_{sc} (the short circuit current across the mucosal surface of small intestine) is a function of Na conc. and that the observed differences in the hexose-dependent potential difference in the presence of mannitol, tris(2-amino-2-hydroxymethyl-1,3-propanediol) on K can be attributed, at least partially, to differences in tissue conductance.

7767 INHIBITION OF INTESTINAL SUGAR TRANSPORT BY PHENOLPHTHALEIN. (E.) Adamič, Š. (U. Manitoba, Winnipeg, Canada) and I. Bihler. *Molec. Pharmacol.* 3(2):188-194, 1967.

The Na-dependent active transport across segments of the small intestine of the hamster, of 3-methy D-glucose, a nonmetabolized glucose analog, was competitively inhibited by phenolphthalein *in vitro*. When sugar accumulation against a conc difference was prevented by metabolic inhibitors or by replacing Na in the bathing medium with Li, phenolphthalein inhibited the specific ion-activated sugar entry process; this is interpreted as

ct inhibition of the sugar carrier. Phenol-
alein was extensively bound to tissue protein,
it could not be determined whether it was
lf transported across the cell membrane.
olphthalein inhibited the Na-dependent in-
inal active transport of α-aminoisobutyric
as well as its entry in the presence of
bolic inhibitors or in Li medium; this suggests
raction with the amino acid carrier. It is
luded that phenolphthalein affects intestinal
r transport by competitively inhibiting the
r carrier. The data do not show to what
nt inhibition of the sodium pump (demonstrated
thers) may participate in inhibition of
r transport.

ISOLATED PERFUSED RAT SMALL BOWEL--
TECHNIC, STUDIES OF VIABILITY, GLUCOSE
RPTION. (E.) Kavin, H. (U. Witwatersrand
Sch., Johannesburg, South Africa), N. W.
n and M. M. Stanley. J. Appl. Physiol. 22(3):
611, 1967.

r fasting overnight the rats were anesthetized
ether and the small intestine exposed by
rtical incision. The intestine was washed
divided into quarters and cannulae inserted
the free ends of the segments. After ap-
riate arterial and venous isolation the in-
ine was perfused through the aorta and drained
ugh the portal vein. The intestinal segments
left in situ, the rat killed and placed in a
tant temperature and humidity chamber. An
ficial plasma and washed bovine RBC were used
erfusate. Schanker's soln. was used for the
stinal lumen fluid. An initial period of
constriction (10 min.) was noted. Vigorous
staltic waves were not found to be a clear
of a viable preparation but in most instances
gn of some failure in the preparation. O_2
umption was 0.09 ml O_2/min./g dry intestine
and was not found to change appreciably
ng an experiment. Net uptake of glucose was
mg/min./100 mg dry wt. Glucose was trans-
ed against a conc. gradient, despite a net
of water into the lumen from the blood
eam, this occurred to the extent of 0.2-32.9%
he initial water in the lumen. Histologically,
villous pattern appeared normal after 1-2 hr.
fusion. It is concluded the technic has wide
lication in the study of intestinal absorption,
retion and metabolism.

9 ABSORPTION OF GLUCOSE FROM THE SMALL
INTESTINE IN EXPERIMENTAL HYPERTENSION.
s.) Amirov, N. S. (Inst. Normal Pathol.
siol., Acad. Med. Sci., Moscow). Pat. Fiziol.
. Ter. 11(1):75-76, 1967.

erimental hypertension was induced in 8 dogs
the method of Goldblatt (repeated constriction
the renal arteries at a 2-wk. interval); the
mals were divided into 3 groups as follows:
up 1 (3 dogs) isolated intestine removed from
proximal portion of the jejunum; Group 2
(3 dogs) with a jejunal fistula; and Group 3 (2 dogs) with isolated segments of the central part of the small intestine. In Group 1, absorption of glucose (in % of admin. glucose), 30 min. after the admin. of 20 ml of a 10% glucose soln. into the isolated intestine, varied between 20.4-65.3 during hypertension, as compared to 56.4-78.8 in controls; the blood sugar content on a fasting state, studied in 1 of 3 animals, was 72.0 mg% in hypertension and 69.0 mg% in controls. In Group 2, the increase in blood sugar (after admin. of 150 ml of glucose soln.) and blood sugar conc. in the fasting state was 53.5-87.0 mg% and 75.1-91.1 mg%, resp., as compared to 38.2-47.3 mg% and 56.3-79.1 mg%, resp., in controls. A reliable increase in blood sugar conc. in the fasting state was found in only 1 of 3 animals. The percentage of glucose absorption from the isolated intestine in Group 3 was 64.8-71.2 in hypertensive animals, and 34.7-40.5 in controls. Blood sugar content in the fasting state, studied in 1 of 2 animals, was 88.5 in hypertensive animals and 102.5 mg% in controls. Thus, in experimental hypertension, variable changes of glucose absorption were found from different parts of the small intestine. It is the author's opinion that decreased absorption from the proximal portion of the jejunum may be related to disruption in blood supply in this region, and that the increase in absorption from the total intestine may be related to an increased blood supply in the remaining part of the small intestine.

7770 EFFECT OF INTRA-INTESTINAL INJECTION OF INSULIN ON GLYCEMIA. STUDY ON THE RAT. (Fr.) Rougereau, A. (Fac. Med., Tours, France), E. Aron and J. Thouvenot. C. R. Soc. Biol. (Paris) 160(11):2187-2192, 1966.

Glycemia was studied in fasting rats (200-300 g) under artificial respiration and infused via the jugular vein with 0.9% NaCl 3 ml/hr.; the blood of the animal, treated with 0.6 mg of heparin, was taken from the femoral vein or the portal vein by a fine catheter (total 3 ml/hr.). The blood glucose was determined by an autoanalyzer. The soln. of glucose which passed down an intestinal loop of 15-20-cm was recovered at the end of the loop for glucose determination in the autoanalyzer. The flow of these soln. through the lumen of the loop was about 4.5 ml/hr. The intraluminal inj. of insulin only elicited 2 types of action on the initial levels of blood glucose: when the blood glucose was between 70 and 90 mg% intraluminal insulin caused hypoglycemia, but when the blood glucose was more than 90 mg% a slight hyperglycemia resulted. Only doses of insulin greater than 2 I.U. had any effect, which seems to confirm the fact that the rat is relatively insensitive to insulin. Inj. of 8 U into the intestinal lumen caused a drop in blood sugar from 80 mg% to 30 mg% in 30 min. with recovery to 80 mg% in about 90 min. after inj.; this was the course followed in the blood obtained from the femoral vein. Blood taken from the portal vein showed a blood sugar rise to

135 mg% at 40 min. then a fall to 65 mg% at 60 min. Intraluminal inj. of 10 I.U. insulin and phlorhizin 1 x 10^{-3} caused death by aglycemia at 65 min. The preceding tests were all done with 0.9% NaCl in the intestinal loop. When glucose was inj. i.v. (2 g/liter, 2 ml vol.) blood glucose rose from 105 mg% to 235 mg% in 35 min. then began to decline; the same conc. of glucose containing 4 U of insulin showed 42% less of a rise. Using the same conc. of glucose, and glucose and insulin, in the intestinal lumen produced hyperglycemia in the former, but an actual fall in the latter after a 5-min. interval. When the lumen was infused with these same soln. the rise in blood sugar in the portal vein was only about half that with insulin as without it; with insulin the slope was less but continued rising for a longer period, about 75 as compared to 40 min.

7771 TRANSPORT OF THIAMINE-^{14}C IN RAT INTESTINE, *IN VITRO*. I. RELATIONSHIP BETWEEN PHOSPHORYLATION OF THIAMINE AND ITS TRANSPORT AGAINST THE CONCENTRATION GRADIENT. (It.) Rindi, G. (U. Ferrara, Italy) and U. Ventura. *Boll*. *Soc*. *Ital*. *Biol*. *Sper*. 42(24):1974-1977, 1966.

In 8-cm sections of rat small intestine, derived from Wistar-strain animals weighing 120-150 g and incubated with ^{14}C-labeled thiamine (thiazole-2-^{14}C at 0.1 mc/1.26 mg) in Krebs-Henseleit soln. for 1 hr. at 37°C, the conc. of radioactive thiamine phosphate in the intestinal wall (n-moles/500 mg wet tissue) was approx. double the conc. of radioactive, nonphosphorylated thiamine in the serosal fluid (also expressed as n-moles/500 mg wet tissue), even though the conc. in serosal fluid had increased by 2.5-3.0 times. When inhibitors of cellular metabolism were added to the incubation liquid, both the conc. of thiamine in serosal fluid and the conc. of thiamine phosphate in parietal tissue were reduced sharply. In the absence of such inhibitors, the increase of thiamine conc. in serosal fluid was uniform and progressive throughout the 1-hr. observation period; that of intraparietal thiamine phosphate peaked within 20-25 min., with no significant increase thereafter. It is concluded that *in vitro* transport of thiamine in the rat intestine does not parallel the gradient of conc. in serosal fluid, but is linked directly to the phosphorylation activity of the intestinal mucosa. (See also GAC #7772 and #7773.)

7772 TRANSPORT OF THIAMINE-^{14}C IN RAT INTESTINE, *IN VITRO*. II. EFFECTS OF CERTAIN STRUCTURAL ANALOGS OF THIAMINE ON ITS TRANSPORT AND PHOSPHORYLATION. (It.) Ventura, U. (U. Ferrara, Italy) and G. Rindi. *Boll*. *Soc*. *Ital*. *Biol*. *Sper*. 42(24):1977-1979, 1966.

In 8-cm sections of rat small intestine, derived from Wistar-strain animals weighing 120-150 g and incubated with ^{14}C-labeled thiamine (0.1 mc/1.26 mg) in Krebs-Henseleit soln. for 1 hr. at 37°C, addition of 2 x 10^{-5} or 2 x 10^{-6} oxythia to the incubation medium failed to affect the progressively increased conc. of thiamine in t serosal fluid, its phosphorylation by the intestinal mucosa, or its subsequent transport (#7771). However, addition of 10^{-6} M pyrithiam 2-ethylthiamine or 2-butylthiamine resulted in marked reduction of both intraparietal thiamin phosphate and the conc. of thiamine in serosal fluid. It is concluded that the phosphorylati of thiamine by the epithelial cells of the rat small intestine (which these last 3 substances inhibit significantly, *in vitro*) is at least o of the mechanisms which regulates *in vitro* intestinal transport of thiamine. (See also: #7773.)

7773 TRANSPORT OF THIAMINE-^{14}C IN RAT INT TINE, *IN VITRO*. III. EFFECT OF INHIBITORS OF INTESTINAL PHOSPHATASE ON THE TRAN PORT AND PHOSPHORYLATION OF THIAMINE. (It.) Ventura, U. (U. Ferrara, Italy), G. Sciorelli M. V. Bonanni. *Boll*. *Soc*. *Ital*. *Biol*. *Sper*. 42(24):1979-1981, 1966.

In 8-cm sections of rat small intestine, deriv from Wistar-strain animals weighing 120-150 g and incubated with ^{14}C-labeled thiamine (0.1 mc/1.26 mg) in Krebs-Henseleit soln. for 1 hr at 37°C, resulting conc. of thiamine in serosa fluid and of thiamine phosphate in the intest wall were reduced significantly by the additio of 10^{-2} M ethylenediaminetetraacetic acid (but not by the addition of 10^{-3} M or 10^{-4} M) to th incubation media. A less marked, but still si nificant, effect was produced by the addition 10^{-4} M Cu ions in the form of $CuSO_4$, but not b the addition of 10^{-5} M. No significant effect were exerted by the addition of 3.1 µg/ml poly phloretin phosphate or 10^{-4} M Be ions in the form of beryllium chloride. However, every diminution of the conc. of thiamine in serosal fluid, whether or not it occurred at a level c statistical significance, was paralleled by a diminution of the intraparietal conc. of thiam phosphate. (See also: #7771, #7772.)

7774 PHOSPHORYLATION AND UPHILL INTESTINA TRANSPORT OF THIAMINE, *IN VITRO*. (E Rindi, G. (U. Ferrara, Italy) and U. Ventura. *Experientia* 23(3):175-176, 1967.

Everted sacs (8-cm long) from the upper small intestine of rats (Wistar strain, 100-150 g) were prepared and incubated for 1 hr. in Krebs Henseleit soln. as previously described. The initial conc. of thiamine HCl (thiazole-2-^{14}C) was 0.2 µM/ml at both sides of the sac, the initial serosal vol. was 1.2 ml. A 0.5 ml sam of serosal fluid was taken after incubation, t sac homogenized and both were appropriately pr pared and counted. Several metabolic inhibit and thiamine analogs were initially added at t sides of the sac. The results indicate that thiamine was phosphorylated during uphill sport, and that inhibition of phosphorylation the metabolic inhibitors or analogs always ced thiamine uphill transport. This suggests phosphorylation is a basic mechanism for mine intestinal transport. That net transport always more inhibited than thiamine phos- ylation suggests that phosphorylation is not sole mechanism involved.

EFFECT OF LIGATION OF THE PANCREATIC DUCT ON THE ABSORPTION OF RADIO IRON ATS. (E.) Murray, M. J. (U. Minnesota, eapolis) and N. Stein. Gastroenterology):38-41, 1967.

t groups of 10 female Sprague-Dawley rats were studied: Group 1, normal animals; p 2, rats with Fe-deficiency anemia; Group 3, als with ligation of the pancreatic duct; p 4, animals with ligation of the pancreatic and parenteral Fe overload; Group 5, animals ligation of the pancreatic duct and anemia; p 6, animals with fatty livers induced by ine deficiency; Group 7, animals with fatty r and parenteral Fe overload; and Group 8, als with ligation of the pancreatic duct fatty liver. Each group was given an p.o. of ^{59}Fe as ferrous citrate and the total activity was measured 14 days later; the vity remaining at the end of 14 days was rded as the percentage absorption of ^{59}Fe. order to compare the immediate effect of liga- of the pancreatic duct (exclusion of secre- from the gut) with long term effects of ation (atrophy of the exocrine gland), 6 als were studied 3 days and 4 wk., resp., r operation; 6 sham-operated animals served controls. There appeared to be no significant ference between the immediate (3 days after ation of the duct) and late (31-48 days after ration) effects of pancreatic duct ligation the uptake of ^{59}Fe. All animals, other than trols, lost wt.; the hemoglobin levels fell in groups except the controls and the Fe-loaded ty liver group. Whereas animals with fatty er, anemia and with anemia plus pancreatic ligation had statistically significant in- ases in absorption, those with isolated pan- atic duct ligation showed decreases which were significant. Mean ^{59}Fe absorption by the mic group at 14 days was 53.5%, which is h greater than that for the anemic group with t ligation (28.9%). Parenteral Fe admin. eared to depress absorption of the fatty liver up and the group with isolated duct ligation n further. Duct ligation superimposed upon ty liver inhibited the increased absorption ected in the fatty liver group.

6 IRON ABSORPTION FROM LIVER IN YOUNG INFANTS. (Ger.) Eichler, I. (U. ld. Clin. Heidelberg, Germany) and K. Schreier. Kinderheilk. 100(1):57-63, 1967.

ants (12) at an av. age of 15 wk., and in good health, each received in the noon feeding on 3 successive days 100 g of finely homogenized calves' liver. The stools were collected and the total Fe determined. Fe was measured in the blood before and after the intake of liver and in the food (milk as well as liver). The av. amount of Fe ingested by each infant during the test period was 48,292 μg; the av. amount in the feces/infant was 16,412 μg; the difference (i.e., the amount absorbed) was 31,880 μg/infant. About 66% of the Fe presented was absorbed. Fe was absorbed twice as readily from liver as from spinach. In infants Fe was better absorbed from meat and liver than from eggs and vegetables. The serum conc. of Fe increased in 3 infants from an av. of 45 μg% to 144 μg% in 2 hr. after the last liver feeding; 22 hr. after the last liver feeding, the Fe conc. were back to their original pre-feeding levels.

7777 GASTRIC FACTORS INFLUENCING IRON ABSORPTION IN ANAEMIC PATIENTS. (E.) Jacobs, A. (Cardiff Roy. Infirm., Wales), J. Rhodes and J. D. Eakins. Scand. J. Haemat. 4(2):105-110, 1967.

Gastric acid secretion was measured by the histamine-infusion method of Lawrie. In normals, a sample of resting juice was aspirated and the pH measured. Fe absorption was measured by the double-isotope technic (tracer dose of 12.5 μc ^{59}Fe in standard meal and 0.7 μc ^{55}Fe i.v., both as ferric citrate, were given simultaneously and RBC isotope activity measured after 14 days). Absorption was measured twice in 9 healthy men (gastric pH 1-2; hemoglobin 14.5-18.6 g/100 ml) and once in 9 women with chronic Fe deficiency anemia due to menstrual loss (hemoglobin 4.9-8.4 g/100 ml). Acid secretion was 0-48 mEq/hr. Just before the first label meal, normals received 200 ml fresh histamine-stimulated gastric juice from Fe-deficient patients. When the vol. of juice was less than 200 ml it was made up with 0.1 N HCl; the second meal was 3 mo. later (150 ml water instead of juice). In anemic patients absorption of ^{55}Fe was 16-80%, higher in normal than in hyposecretors. In controls, absorption was 4-18% (av. 10.3%) without juice, and 0-23% (av. 8.3%) with anemic juice. With anemic juice, absorption was higher in 2, lower in 6. Differences in absorption in 2 tests were not related to gastric acid secretion or absorption level of donor. Seven women with achlorhydria (5 idiopathic Fe-deficiency anemia, 2 untreated pernicious anemia; hemoglobin 5.6-8.1 g/100 ml) received a known vol. of fresh histamine-stimulated juice from normal secretors (6 women, 1 man) with chronic Fe-deficiency anemia, and a standard meal and Fe label were given. RBC radioactivity (14 days) was used to measure absorption and as a baseline for the second test, also that day (150 ml water). Absorption in achlorhydria was 3.8-43% (av. 11.6%). When juice was added to the test meal, absorption increased 1.5-25.1%, and increase was related to secretion of donor. Range of absorption with juice was

5.3-46% (av. 21.9%), a significant increase for the group as a whole. Absorption was also measured in 3 women, with severe Fe-deficiency anemia and complete achlorhydria (hemoglobin 5.5-6.5 g/100 ml), with 200 ml water and 14 days later with 200 ml 0.1 N HCl. Without HCl, absorption was 18-26.1% (av. 20.8%) and with HCl 30.1-43.2% (av. 35.7%), a significant increase in all 3. The findings that absorption of tracer dose in normals did not increase by simultaneous admin. of gastric juice from anemics and that absorption in achlorhydric anemia increased with admin. of anemic gastric juice due to acid content of gastric juice do not support the hypothesis that there is a substance in gastric juice other than acid which influences absorption.

7778 IRON ABSORPTION AND LIVER IRON DEPOSITION IN THE RAT. (E.) Van Wyk, C. P. (Nat. Nutr. Res. Inst., Pretoria, South Africa). S. Afr. Med. J. 41(16):417-421, 1967.

Six basic diets were given to rats, and within each dietary group there were 6 subgroups, differing in amount of Fe. Iron was supplied to Diets 1-4 as Fe citrate, to 5 and 6 as free; metallic Fe. The basic diets were: 1) semi-synthetic "balanced"; 2) maize porridge meal + 3% NaCl; 3) low protein; 4) "balanced" with maize porridge meal as source of carbohydrate; 5) as in 1; 6) as in 2. In the 6 subgroups, Fe added amounted to 4, 99, 193, 288, 384, and 474 mg/g diet, resp. (added at the expense of the dextrin/maize fraction). After 27 days the rats were killed and liver nonhemoglobin Fe content determined (Kaldor). Determination of Fe absorption involved measurement of difference between amount of Fe ingested during the "balance" period of 10 days (8-17) and amount excreted in feces during this period. Fe absorption usually increased with increased intake, but the rate of increase was a function of diet. Rates (in decreasing order) were: Diets 2, 4, 6, 1, 5, 3 (essentially no increase in absorption with Diet 3). There was a generally close relationship between rate of absorption and liver nonhemoglobin Fe content (6, 2, 4, 1, 5, 3). At comparable Fe absorption levels, much more Fe was deposited in the liver when the diet consisted of metallic Fe and maize (5.12 mg/g dry wt. liver in 6) than with either type of Fe with any other diet (3.2 in 2; 2.07 in 4; 1.70 in 1; 1.49 in 5; 0.89 in 3; all with max. Fe). It is concluded that the most important factors in the etiology of experimental siderosis in rats were a combination of certain properties of maize, high Fe intake, and the presence of free, metallic Fe particles in the diet.

7779 GASTRIC IRON BINDING PROTEIN IN IRON CHELATION BY GASTRIC JUICE. (E.) Davis, P. S. (U. Adelaide, Australia), C. G. Luke and D. J. Deller. Nature (London) 214(5093):1126, 1967.

Samples of gastric juice were obtained from 9 fasting normals before, and at 15, 30, 45, and 60 min. after stimulation of gastric secretion by histamine. Fe-chelating ability was assayed with a radioiron solubility test. Resting and histamine-stimulated samples possessed a marked Fe-binding capacity in all subjects examined. The av. amount of Fe-bound/ml gastric juice was 0.04 mg/ml in fasting juice, 0.02 mg/ml in histamine samples. Therefore, sufficient Fe-bi ing substance should be secreted in gastric jui to chelate all the 15 mg of dietary Fe present in a typical diet. Fe-binding ability was also measured by the passage of gastric juice labele with radioiron through a Sephadex G200 column. While the gastric juice was resolved into 3 maj fractions, the radioiron was bound exclusively by the totally excluded high molecular wt. fraction (above 200,000). Elution curves of simila treated samples of albumin and transferrin show that the gastric Fe-binding protein was neither of these. It is unlikely that Fe is present in the intestinal lumen in ionic form to any appreciable degree.

7780 THE PASSAGE OF FERRITIN INTO JEJUNAL EPITHELIAL CELLS. (E.) Casley-Smith J. R. (U. Adelaide, Australia). Experientia 23(5):370-371, 1967.

Adult rats had a loop of jejunum isolated by ligation of its ends, leaving the blood supply intact. One ml of 5% ferritin in physiological saline was inj. into the loop and left for 3 hr Rats were killed and tissues prepared for elect microscopy by standard methods. The epithelial cells at the distal ends of the villi had numerous particles of ferritin between their microvilli. There were occasional small invaginations at the bases of the microvilli; some o these contained ferritin. Small vesicles in th cell also sometimes contained a few molecules o ferritin. They were also present occasionally throughout the cell membrane systems and, extracellularly, at the bases and sides of the cells. The epithelial cells near the proximal end of th villi had much less ferritin adjacent to their small and infrequent microvilli. In these young cells there were many more small invaginations. There were therefore almost as many ferritin molecules in the invaginations and small vesicle in these cells as in the more distal ones. The fact that a small proportion of intact protein molecules can enter adult rat jejunal epithelial cells through the small vesicles, and pass through them into the body, is suggested to be the basis of intestinal allergic phenomena.

7781 CHANGE IN GASTRIC IRON-BINDING PROTEIN (GASTROFERRIN) DURING IRON-DEFICIENCY ANAEMIA. (E.) Luke, C. G. (U. Adelaide, South Australia), P. S. Davis and D. J. Deller. Lancet 1(7496):926-927, 1967.

One author was made anemic and iron-deficient by repeated venesection and removal of 2500 ml

d in 6 days. Fasting gastric juice was col-
ed before, during and after venesection, and
r 8 wk., by which time hemoglobin and serum
evels had returned to normal. In 2 patients
Fe-deficiency anemia from bleeding duodenal
rs, fasting gastric juice was collected before
l wk. after correction of anemia by trans-
on. Fasting gastric juice was obtained only
he Fe-deficient state in 8 with Fe-deficiency
ia due to gastrointestinal hemorrhage or
rrhagia. Juice was obtained after a 12-hr.
through a stomach tube. Fe-chelating ability
amples was measured by a radio Fe-solubility
. Protein components were separated by pass-
on a Sephadex G200 column. Hemoglobin and
n Fe of all patients were measured on several
sions. Fe-binding capacity was decreased in
ia and returned to normal with correction of
ia. Vol., solid content, and acidity after
amine stimulation of gastric juice did not
significantly. In the 2 duodenal ulcer-
ics, restoration of normal hemoglobin and
n Fe levels was accompanied by a 10-fold
ease in the previously reduced Fe-binding
ity. In the 8 hemorrhagic anemics Fe-binding
city was also reduced. Gel filtration re-
ed in similar elution patterns in all patients.
Fe-binding component was always found in the
-molecular-wt.-excluded fraction, and its
vity varied in the same way as that of the
e gastric juice. The results support the
ept that the Fe-binding protein gastroferrin
uction is concerned with regulation of Fe
rption in health: normal levels inhibit
rption of excessive amounts of Fe present in
diet; reduced levels permit the enhanced
rption of Fe in Fe deficiency.

SALICYLATES AND IRON ABSORPTION.
COMPETITION OF SALICYLATE AND GASTRIC
E FOR IRON. (E.) Davis, P. S. (U. Adelaide,
ralia) and D. J. Deller. Gastroenterology
):691-694, 1967.

n. of a salicylate-Fe complex in a 50:1
r ratio did not alter radioiron absorption in
al subjects. Although salicylate has the
ity to chelate Fe *in vitro*, its ineffective-
in vivo was shown to be due to the stronger
nity of gastric juice for Fe. A high mole-
r weight protein fraction in gastric juice
essfully competes with salicylates for the Fe,
ering the salicylate ineffective in Fe
rption. No evidence was found to support
proposal that a mechanism for a salicylate
ia is the formation of an inhibitory Fe-sali-
te complex.

3 A COMPARISON OF INTESTINAL ABSORPTION
IN THE RAT OF ELAIDIC, OLEIC, AND STEARIC
S FED IN THE FORM OF MIXED TRIGLYCERIDES
RISING FIVE FATTY ACIDS WITH RANDOM DISTRIBU-
. (Fr.) Lavoue, G. (Fac. Sci., Dijon,
ce) and J. Clement. Bull. Soc. Chim. Biol.
is) 49(4):379-388, 1967.

White rats (200 g) fasted for 15 hr. were given 1200 mg of food containing 20% lipids. These triglycerides were of mixed composition, containing 5 fatty acids distributed at random among the 3 positions on the glycerol: palmitic; $1\text{-}^{14}C$-stearic; $9,10\text{-}^{3}H$-oleic, (specific activity of each acid 50,000 ipm/mg); elaidic and linoleic; the percentages in moles of these acids were, resp., 26.4, 18.5, 19.7, 22.3 and 13. The thoracic lymph duct was cannulated 90 min. after feeding. Lymph was collected during a 24-hr. period and kept at 0°C. The collected lymph as well as the contents of the intestinal lumen and the mucosa scraped from the anterior two-thirds of the small intestine, were separately extracted for lipids, the triglycerides separated from the other lipids and the different triglycerides separated by silicic acid column chromatography. The 2 radioactive fatty acids were quantitatively determined by gas chromatography, and the other 3 fatty acids by differential methods. The lymphatic triglyceride determinations showed that the amount of elaidic acid incorporated was higher than the 2 labeled fatty acids; elaidic acid was preferentially located on the external positions, stearic or oleic occupying the middle position. Analysis of the luminal content and analysis of the mucosa showed that intraluminal lipolysis of triglycerides formed β-mono-elaidine which entered the mucosal cells where the freed elaidic acid was incorporated in the external positions of newly synthesized triglycerides.

7784 A LIPID-SOLUBLE INERT INDICATOR IN FAT ABSORPTION STUDIES IN THE RAT. (E.) Sie, H. G. (U. Groningen, Netherlands), A. J. Valkema and F. J. Loomeijer. J. Lab. Clin. Med. 69(6):989-996, 1967.

Wistar albino rats weighing 200-250 g were used in a long-term feeding experiment to test the suitability of lipid-soluble DC Silicone Fluid 703 (a methylphenyl polysiloxane compound) as an inert indicator in fat absorption studies. Recovery of the fluid from rat stools during the first 5 days following admin. of 536 mg by gastric tube was 96.0%, as contrasted to 93.8% when known amounts were added to rat feces *in vitro*. The fluid exerted no statistically significant influence on absorption of glyceryl-tristearate-$1\text{-}^{14}C$ in olive oil, admin. in p.o. doses of 75, 150 and 300 mg. As calculated by the inert indicator method, using Fluid 703, 88.8% of the 75 mg peroral dose was absorbed; as determined by quantitative analysis of the radioactivity in 2-day collections of stools, it was 89.2%.

7785 ABSORPTION OF CHOLESTEROL FROM A MICELLAR SOLUTION: INTESTINAL PERFUSION STUDIES IN MAN. (E.) Simmonds, W. J. (Rockefeller U., New York, N. Y.), A. F. Hofmann and E. Theodor. J. Clin. Invest. 46(5):874-890, 1967.

The absorption of cholesterol has been studied in man by perfusing the upper jejunum with a micellar soln. of bile salt, 1-monoglyceride, and cholesterol-^{14}C, with a triple lumen tube with collection sites 50-cm apart. The absorption of micellar components between the collection sites was calculated from their conc. changes relative to those of the water-soluble marker, polyethylene glycol. Bile salt was not absorbed (-3%), but micellar monoglyceride was rapidly hydrolyzed and absorbed almost completely (98%). Cholesterol radioactivity was absorbed to an intermediate extent (73%), and the absorption of chemically determined cholesterol (46%) indicated that much of the disappearance of radioactivity represented true absorption and not simple exchange. The specific activity of the perfused cholesterol fell during passage through the loop which suggests the continuous addition of nonradioactive endogenous cholesterol by the test segment. However, the decrease in specific activity may also be considered to signify exchange, in that nonradioactive molecules entered the lumen as radioactive molecules were absorbed. Plant sterols appeared in the intestinal contents during the perfusion and must have been contributed by the perfused segment. Cholesterol in the perfusate or upper collection site samples did not sediment (ultracentrifuge), but 23% of the cholesterol in the lower collection site samples was sedimentable; bile salt, as control, was not sedimentable. Solubility experiments in model systems showed that cholesterol possessed low solubility in bile salt soln.; its solubility increased markedly and in linear proportion to the amount of fatty acid or monoglyceride or both that was added to the bile salt soln. These findings suggest that polar lipid such as fatty acid or monoglyceride as well as bile salt is essential for normal micellar solubilization of cholesterol in intestinal content. They suggest the necessity of considering an insoluble sedimentable phase of particulate sterol in intestinal content as well as an oil and micellar phase for a complete description of sterol absorption. The marked difference in the rates of absorption of individual micellar components suggests that micellar lipid is not absorbed as an intact aggregate and is consistent with the view that polar lipid such as fatty acid is absorbed in molecular form by diffusion from a micellar soln. The experiments confirm previous findings demonstrating that fat absorption without bile salt absorption occurs in the upper small intestine in man.

7786 EFFECTS OF VARYING LIPID COMPONENTS OF THE DIET ON TOLERANCE, INTESTINAL ABSORPTION AND THE COMPOSITION OF SUBCUTANEOUS FAT IN THE PREMATURE INFANT. (It.) Ansanelli, V. (U. Naples, Italy), P. Tiberio and L. Lupi. Pediatria (Napoli) 74(6):989-1008, 1966.

A total of 22 premature neonates, weighing 1800-2400 g at the start of the study and born during the 32nd-38th wk. of gestation, were fed milk containing 50-100 calories per kg per day (depending on age and size), beginning on the third day postpartum and divided into 7-8 feedin One group received homogenized, pasteurized huma milk; 2 received 2 different brands of commercia powdered milk with an approx. equal content of total lipids and both mono- and polyunsaturated fatty acids (except for a considerably increased content of linoleic acid); one received acidifie partly skimmed cow's milk, also powdered, which had a significantly lower content of total lipid and a generally reduced content of unsaturated fatty acids, especially linoleic. In all 4 groups tolerance was as good as that found in children receiving mother's milk or partly skimm cow's milk. During the first 2 wk., much of the lipid content was not absorbed through the intestine, but the absorption rate increased progressively thereafter, reaching a sufficient degree to modify the fatty acid content of s.c. adipose (gluteal) tissue by the end of the first mo. At this latter time, the percentage distrib tion of mono- and polyunsaturated fatty acids in biopsy specimens derived from the gluteal region paralleled the percentage distribution of the particular milk being fed, even though this was considerably different from the distribution evidenced in biopsy specimens obtained at birth.

7787 IMPORTANCE OF BILE ACIDS AND OF AN INTACT DISTAL SMALL INTESTINE FOR FAT ABSORPTION. (E.) Austad, W. I. (Duke U. Med. Ctr., Durham, N. C.), L. Lack and M. P. Tyor. Gastroenterology 52(4):638-646, 1967.

The enterohepatic recirculation of Na taurochola 24-^{14}C was studied in 2 volunteer medical studen and 2 patients with disorders of the distal small intestine. One patient had a jejunocolic fistula created surgically for the management of obesity, and the other had irradiation for a carcinoma of the cervix. In the normal subjects the exponential decline in specific activity, cpm/mg, of Na taurocholate-^{14}C in duodenal sampl permitted estimation of the kinetics of the enterohepatic circulation. These observations, when compared with previous investigations, suggest that approx. 30% of the cholate pool in normal man consists of cholic acid conjugated wi taurine. Significant steatorrhea was demonstrab in both patients. However, their proximal small intestine appeared normal from morphological and biochemical studies. The Schilling test was abnormal in both patients. A virtual absence of enterohepatic recirculation for Na taurocholate-^{14}C was demonstrated in 2 patients. In addition recirculation of unconjugated or newly conjugate cholate-^{14}C was negligible. These experiments demonstrate clearly the importance of the distal small intestine in maintaining the enterohepatic recirculation of Na taurocholate. They also poi up the importance of an intact enterohepatic circulation of bile salts to the overall process of lipid absorption in man.

7788 CONCENTRATION AND COMPOSITION OF FATTY ACIDS OF THORACIC DUCT LYMPH LIPIDS FROM RABBITS. (E.) Kotani, M. (U. Kyoto Med.

., Japan), K. Seiki, A. Yamashita, A. Takashima,
Nakagawa and I. Horii. Amer. J. Physiol.
(1):235-238, 1967.

-liquid chromatography was used to study
conc. and composition of fatty acids of
racic duct lymph lipids from rabbits in high
low absorptive states of lipids. The conc.
the triglyceride fatty acids greatly increased
lymph during intensive absorption. The phos-
olipid fatty acids and free fatty acids also
creased markedly, but to a lesser degree than
the triglyceride fatty acids. There was
ther an increase nor a change in the cholesterol
ter fatty acids. The fatty acid composition of
iglycerides and free fatty acids varied con-
derably in high and low absorptive states of
pids. Composition of triglycerides in lymph
ring intensive absorption was similar to that
the dietary triglycerides. In contrast, there
re few changes in the fatty acid composition of
olesterol esters and phospholipids.

89 EFFECTS OF PORTAL SYSTEMIC SHUNTING ON INTESTINAL ABSORPTION IN THE DOG
D IN MAN. (E.) Price, J. B., Jr. (Columbia
, New York, N. Y.), W. McCullough, L. Peterson,
C. Britton and A. B. Voorhees, Jr. Surg.
nec. Obstet. 125(2):305-310, 1967.

rge (2-3-cm) and small (0.5-1.0-cm) portacaval
unts were created in dogs, and intestinal
sorption rates of xylose, urea and ammonia
re measured before and after the shunts.
atistically significant increases of 50% in
lose absorption and of 16% in ammonia absorption
re found in animals with large shunts, while a
aller increase of 6.5% in urea absorption was
ted. There were no significant changes in
lose, ammonia or urea absorption in dogs with
all shunts. The absorption of D-xylose was
asured in 13 patients (nonascitic) with portal
pertension before and after a portal systemic
unt; 10 of the patients had cirrhosis of the
iver and 3 had portal vein thrombosis; there was
highly significant av. increase of 31% for the
tire group after the shunt. The absorption of
-xylose was also determined in 10 patients (who
erved as controls) before and after cholecys-
ectomy; there was no change in xylose absorption.
t is suggested that these changes in intestinal
bsorption were due to an augmented microcircula-
ion in the intestine after a hemodynamically
ffective portal systemic shunt. This increased
ntestinal absorption of ammonia and other
assively absorbed substances is thought to
e another factor tending to produce neurologic
omplications after a large portal systemic shunt.

790 INTESTINAL TRANSPORT OF VALINE AS AFFECTED BY IONIC ENVIRONMENT. (E.)
eiser, S. (Indiana U. Sch. Med., Indianapolis)
nd P. A. Christiansen. Amer. J. Physiol.
12(6):1297-1302, 1967.

Everted intestinal sacs derived from fasting, male Wistar rats were incubated for 60 min. at 37°C with Krebs-Ringer bicarbonate buffer, pH 7.4, containing 118 millimoles NaCl, 25 millimoles $NaHCO_3$, 4.7 millimoles KCl, 2.5 millimoles $CaCl_2$, 1.2 millimoles $MgSO_4$, 1.2 millimoles monobasic potassium phosphate and both radioactive and nonradioactive L-valine to a final conc. of 3 millimoles (1-10 x 10^3 cpm/ml). Isotonic replacement of half the indicated amount of NaCl by LiCl, KCl, mannitol or sucrose resulted in 66.4%, 39.0%, 15.3% and 13.7% inhibition of net valine transport, resp. Substitution of choline chloride, as above, exerted no appreciable effect in the presence of Na ion conc. as low as 30 mmoles; however, below that conc. level, valine transport decreased abruptly to the point of virtually total inhibition in the absence of Na. Optimal valine transport, which occurred over a pH range of 5-8, did not appear to require the presence of Mg, Ca, K or phosphate ions in the incubation medium, but isotonic replacement of Na and KCl by the corresponding sulfates inhibited transport by 25-30%. Following 1 hr. incubation of the sacs in medium containing 118 millimoles Na, intracellular Na content increased to approx. 4 times initial levels.

7791 ABSORPTION THROUGH INTESTINAL EPITHELIUM AS INFLUENCED BY PHOSPHOLIPIDS. (E.) Levine, R. R. (Boston U. Sch. Med., Mass.) and P. J. Kornguth. Protoplasma 63(1-3):132-135, 1967.

7792 LOCALIZATION OF THE SMALL-INTESTINAL DISACCHARIDASES. (E.) Dahlqvist, A. (U. Lund, Sweden). Amer. J. Clin. Nutr. 20(2): 81-88, 1967.

7793 STUDIES ON INTESTINAL DIPEPTIDASES. (E.) Lindberg, T. (U. Lund, Sweden). Acta Physiol. Scand. 69(Suppl. 285):5-38, 1966.

7794 COMPARTMENTAL MODELS IN THE ANALYSIS OF INTESTINAL ABSORPTION. (E.) Segre, G. (U. Camerino, Italy). Protoplasma 63(1-3):328-335, 1967.

7795 INTESTINAL ABSORPTION OF FAT. (E.)(Rev.) Johnston, J. M. (U. Texas Southwestern Med. Sch., Dallas) and G. A. Rao. Protoplasma 63(1-3):41-44, 1967.

7796 GASTROINTESTINAL ABSORPTION OF ^{59}Fe AND TISSUE DISTRIBUTION OF ABSORBED RADIOIRON IN PROTEIN-DEFICIENT RATS AND RESTORED WITH A DIET CONTAINING CASEIN OF DIFFERENT MIXTURES OF AMINO ACIDS. COMPARATIVE EFFECTS OF THESE DIETS ON ERYTHROPOIESIS. (Fr.) Aschkenasy, A. Arch. Sci. Physiol. (Paris) 21(2):127-151, 1967.

7797 THE PARTICIPATION OF THE NERVOUS SYSTEM IN THE HISTAMINE SECRETION OF THE GASTRIC GLANDS. (Rus.) Maevskaia, N. V. (Donets Med. Inst., USSR). Biull. Eksp. Biol. Med. 62(11): 13-17, 1966.

The role of the nervous system in the reaction of gastric glands to histamine was studied in 5 dogs with a Pavlov pouch and in 6 dogs with a Heidenhain pouch by the method of pharmacological and anatomical denervation. The admin. of hexamethonium (6-10 mg/kg, s.c., or 2 mg/kg, i.v.) 5-30 min. before histamine resulted in a decrease in secretion by an av. of 43.9% in 10 of 11 dogs. Under the action of hexamethonium, the latent period of histamine secretion is prolonged (i.e., from 10.7 to 13.0 min.), acidity of the gastric juice was decreased (i.e., from 119.0 to 99.1 ml), as was the amount of HCl secreted (i.e., from 41.5 to 19.1 mg). Bretylium compounds (9-10 mg/kg, s.c.) admin. 30 min. before histamine increased secretion in 3 dogs with Heidenhain's pouch; acidity of gastric juice was increased, as well as the total secretion of HCl (from 33.2 to 68.2 mg) and the amount of proteolytic enzyme (from 99.25 to 600 special U). In 3 of 4 dogs, denervation caused a decrease in secretion of gastric juice (i.e., from 8.39 to 3.05 ml). In the dog in which hexamethonium was ineffective, denervation also did not affect secretion. The action of bretylium compounds on the secretion was accomplished by blocking neural impulses. Therefore, gastric gland reactivity to histamine is defined by a correlation of parasympathetic and sympathetic actions on the secretory apparatus.

7798 THE ROLE OF THE HYPOPHYSIS IN CONTROL OF SECRETION AND TROPHIC FUNCTION OF GASTRIC MUCOSA. (Rus.) Lipovsky, S. M. (Sanit. Hyg. Med. Inst., Leningrad, USSR) and A. S. Zaichik. Pat. Fiziol. Eksp. Ter. 11(1):63-68, 1967.

In a total of 80 rats, gastric secretion was studied on adult male rats (wt. 200-220 g) with plexiglass fistulae, which underwent hypophysectomy 4-6 wk. later; rats without fistulae were used to study daily diuresis and excretion of pepsinogen after hypophysectomy. The time of placement of the fistula into the stomach (from the eleventh to the seventy-first day) had no evident effect on the amount of the excreted juice and its composition. By 7-19 days after hypophysectomy, total acidity was decreased an av. of 40% and the amount of free HCl by 39% compared to initial values; the amount of excreted gastric juice, pepsin conc. and pepsin excretion remained unchanged. Initially diuresis was increased after hypophysectomy, and later it became normalized. Thus, hypophysectomy had no essential effect on the amount of excreted gastric juice; the pepsin-forming function of the chief cells was significantly reduced, and pepsinogen excretion in the urine was not disturbed. Rats which had been fasted for 48 hr. were laparotomized and a ligature was imposed on the pylorus; after narcosis had ended, the rats were given 2 ml of a 7% decoction of dry cabbage containing 3% NaCl and 24 hr. later they were sacrificed, thei stomachs removed and the mucous membrane examine Hypophysectomy did not impede development of ulcerative lesions in the gastric mucous membran In the rats with hypophysectomy the number of ulcers was greater (98) than in rats without hypophysectomy (64). At 13-18 days after operation, the gastric mucous membrane in hypophysect mized rats was increasingly ulcerogenic.

7799 HISTIDINE DECARBOXYLASE IN THE STOMACH OF THE RAT. (E.) Radwan, A. G. (U. London) and G. B. West. J. Pharm. Pharmacol. 19(5):305-312, 1967.

A supernatant extract of homogenized rat stomach was prepared. Stomachs of other rats were cut into fundic and pyloric sections. Stomach enzyme was measured and compared in fed-rats and rats starved for 24 hr. Whole-stomach enzyme showed 2 pH peaks, 5.6 and 7.6. Only the pH 5.6 peak was present in fundic sections, only the 7.6 in pyloric. Max. enzyme activity in fundic section was 10 times that in the pylor At pH 7.6 there was a linear relationship betwee substrate conc. and pyloric enzyme activity; the plot was hyperbolic at 5.6 for fundic enzyme. The apparent Michaelis constant (K_m) of the enzyme was 1.07×10^{-4} g/ml (7×10^{-4} M) for fundic and 2.67×10^{-4} g/ml (1.7×10^{-3} M) for pyloric. Rates of reaction of both preparations, at the resp. pH optima, increased with increasing enzyme conc. At optimum pH both preparations showed a linear relationship between enzyme activity and length of incubation. Activity of pyloric enzyme disappeared rapidly at -15°, with only 10% of the activity left after 14 days. Cold had little effect on fundic enzyme. Activit of pyloric enzyme was increased by 20% by 20 mg benzene, while fundic enzyme was unaffected. Both α-methylhistidine and L-α-methyldihydroxyphenylalanine inhibited activity of pyloric enzyme but had no effect on fundic, even at a conc. of 1 mg. Dihydroxyphenylalanine and serotonin had no effect on fundic enzyme, but competed with substrate for pyloric enzyme. Starvation caused a 97% inhibition of fundic enzyme activity, but only 21% of pyloric; a 33% reduction in histamine content of pyloric portion, but no effect on fundic. It is suggested that fundic histamine is kept at a low basal level and that histamine formed by high enzymatic activity in this portion is catabolized at a fast rate or transported to other parts of the body. Two such enzymes are also found in the mouse stomach; pH optimum of fundic enzyme is 5.6 of pyloric 7.6-8.0.

7800 PENTAGASTRIN AS A STIMULANT OF MAXIMAL GASTRIC ACID RESPONSE IN MAN:

LTICENTRE PILOT STUDY. (E.) Fitzgerald, J. D.
.I. Pharmaceuticals, Alderly Park, Cheshire,
and). Lancet 1(7485):291-295, 1967.

combined experiences of more than 150 tests
different medical centers were examined in
r to determine if acid responses as large as
e to max. doses of histamine could be obtained
pentagastrin. The incidence and severity
ide effects were also compared with histamine.
experience was with surgical patients suffer-
from duodenal ulcers, although observations
uded a few patients without gastrointestinal
ase, and health volunteers. Timing pattern
ies of s.c. and i.v. admin. were made to
are max. responses to both drugs. It was
luded that gastric acid responses as great
hose to max. doses of histamine can be
ined with pentagastrin from the intact stomach.
ppeared that suitable doses for max. response
entagastrin are approx. 6 μg/kg s.c., and
/kg/hr. by continuous i.v. admin.

FUNCTION OF ACINAR CELLS AND CELLS OF
THE PAROTID GLAND DUCTS UNDER LONG-
ING STIMULATION. (Rus.) Nechaeva, N. V.
ertzov Inst. Animal Morphol., Acad. Sci.
ow) and V. I. Dmitrieva. Arkh. Anat. 52(3):
8, 1967.

ale albino rats (110-140 g), after feeding
p.o. admin. of distilled water (controls),
absolute rate of protein increase in the
plasm of acinar cells or salivary tubule
s of the parotid gland was 2.32 or 1.16/mm^2,
. A decrease of cellular dry wt. of acinar
s during the initial 10 min. was followed by
adual increase of protein in the cytoplasm.
ubular cytoplasm, max. accumulation occurred
r 60 min. In rats that had been fed and
n. p.o. with 0.5% HCl, the dry cytoplasmic
of the acinar cells decreased, but the
tion of secretion was approx. 40 min.; the
city of increase of protein in the cytoplasm
cinar or salivary tubule cells was 1.47 or
pg/min., resp. The largest increase of
lar cell dry wt. was found 60 min. after food
chemical stimulation. Rats which were fed
admin. 1.5% HCl exhibited excretion, but its
tion increased when compared to the above
ations of the experiment. An accumulation
ytoplasmic protein occurred again in the
od between 120 and 180 min. The velocity of
ein increase in acinar cells and in salivary
le cells was 0.78 and 2.47 pg/min., resp.
ccumulation of proteins in the tubular cells
rred after 40 min. Therefore, the amount of
ar cell protein decreased after repeated
of HCl when compared to controls, but total
wt. of the acinar cells was higher than that
controls. Apparently, additional stimulation
the salivary cells by HCl decreased synthesis
secretory proteins, i.e., it caused the
retion of saliva which was poor in organic
pounds, without disturbance of structural
tein synthesis. Alteration in the speed of
protein accumulation in tubule cells during the process of prolonged stimulation of the parotid gland and the marked increase of protein in tubular cells during the decrease of protein synthesis in the acinar cells is a sign of protein synthesis and not of simple protein adsorption by salivary tubule cells.

7802 THE EFFECT OF YEAST ON GASTRIC SECRETION IN DOGS. (Rus.) Zitler, T. N. (Sci. Res. Inst. Nutr., Acad. Med. Sci., Moscow) and S. Y. Mikhlin. Vop. Pitan. 26(1):53-58, 1967.

Dry brewer's yeast (50 g), given to 1 dog with a Pavlov pouch and to 1 with a Heidenhain pouch, was a very strong stimulant of gastric secretion. Yeast-induced secretion was markedly superior to that induced by bread, meat, beef bouillon, etc. In the Pavlov dog, yeast-induced gastric secretion was higher (31.75 ml after 3 hr.) than secretion induced by yeast and bread (13.1-16.8 ml, and 10.0-13.6 ml, resp., after 6 hr.). Yeast-induced secretion was higher in acidity and lower in pH and pepsin content than meat- or bread-induced secretion. Yeast- and beef buillon-induced secretion was more acidic and lower in pH than that induced with meat and bread. There was a latent period of 10 min. in the Pavlov dog. In the Heidenhain dog, bread induced a secretion of 2.0-4.5 ml and of low acidity after 6 hr.; the latent period fluctuated from 45-60 min. After feeding with meat, gastric juice secretion reached 4.1-7.8 ml. Yeast-induced secretion amounted to 35.8 ml. Max. secretion of gastric juice in the Pavlov dog occurred after 1 hr., and in the Heidenhain dog after 2 hr. Both secretions were qualitatively identical. Yeast-induced gastric secretion markedly exceeded that induced by beef bouillon and cabbage juice. The stimulatory effect of yeast may be related to its higher content of vitamins, mostly of the B complex when compared to the other stimulants. The fact that yeast greatly increases gastric secretion may be of clinical importance.

7803 THE STUDY OF THE PH OF THE FASTING GASTRIC CONTENTS IN HEALTHY PERSONS BY MEANS OF THE PH RADIOCAPSULE. (Rus.) Belousov, A. S. (Cent. Inst. Advanced Train. Phys., Moscow) and B. E. Vochal. Vrach. Delo (1):42-47, 1967.

In contrast to the results of thin sound detection, which showed the presence of free HCl (on an empty stomach) in 50% of 67 persons studied (42 men, 25 women; 18-47 yr. old), use of radiotelemetric registration showed that 50 of 67 had free HCl (pH 1-5). Three basic types of gastric secretion were demonstrated in fasting, healthy subjects by means of prolonged radiotelemetric pH studies of the stomach contents; these were excitable, inhibitory and inert. The irritable or excitable type of secretion, which was found in 50 individuals, was characterized by a larger or smaller amount of gastric content of pronounced acidity (total acidity sometimes reached 130; free HCl, 100-120 titration U) and digestive strength; entrance of the radiocapsule into the stomach was followed by stabilization of the pH (approx. 2-0.8), which remained at this level during the entire period of observation. The inhibitory type of secretion, found in 8 individuals, was characterized by the prevalence of gastric mucus in the gastric contents and the absence of free HCl; total acidity did not exceed 20 titration U, the digestive strength was zero and pH was 7-8 during all of the observation period. The inert type of secretion was found in 9 individuals and was characterized by the absence of free HCl during the first 20-30 min. of observation; the amount of gastric contents fluctuated, consisting chiefly of mucus, and pH was 7.8-9.0. In addition, by the titration method (markedly later) and by the radiocapsule pH method (markedly earlier), free HCl, reaching max. values toward the end of the second hr. of study, was found in the gastric contents; pH was 1-3. Admin. of drinking soda (0.5 g) in water (30 ml) to individuals with the excitable type of secretion produced a rapid (15-30 sec.) increase of pH to 7-9, which lasted approx. 5-10 min.; this was followed by a rapid (1-2 min.) return to initial values. In those with an inert type of secretion, the admin. of drinking soda in water caused a marked increase of pH from 1-2 to 8-9, which lasted 10-20 min. and this was followed by a gradual decrease to initial values. Thus in healthy persons, the velocity and intensity of alkali neutralization and the time required for restoration of the initial pH values, was dependent on the type of gastric secretion.

7804 INFLUENCE OF ACETYLCHOLINE AND BENACTYZINE ON CENTRAL CHOLINERGIC STRUCTURES REGULATING GASTRIC SECRETION.

(E.) Anichkov, S. V (Inst. Exp. Med., Leningrad, USSR) and L. L. Grechishkin. Arch. Int. Pharmacodyn. 166(2): 417-423, 1967.

In dogs the common carotid was exteriorized into a cutaneous flap, the external carotid ligated and the carotid sinus denervated. After recovery a catheter was easily placed by puncture into the carotid artery and could be left in place several wk. The dogs were also prepared with gastric fistulae. Acetylcholine (5 μg/kg/min. i.v.) increased gastric secretion; a similar effect was produced by carotid infusion of 0.25 μg/kg/min. Histamine (0.001-0.25 μg/kg/min.) was equally effective by the i.v. or carotid route. Benactyzine (0.25 μg/kg/min. by intracarotid route blocked secretion induced by intracarotid acetylcholine while the same dose of benactyzine i.v. was without effect, and was less than the dose necessary to produce peripheral inhibiting effects. Gastric secretion induced by sham feeding in esophagectomized dogs was blocked by intracarotid infusion of 0.5 μg/kg/min. of benactyzine. the same dose i.v. was about a third as effective. The depression in secretion following intracarotid infusion is attributed to centrally-located cholinergic structures involved in the regulation of gastric secretion.

7805 VASODILATATION, A METHOD FOR IMPROVING ACID-PEPTIC ACTIVITY OF THE STOMACH.

(E.) Fikry, M. E. (Alexandria U., Egypt). Acta Gastroent. Belq. 30(1):82-90, 1967.

The effects of 2 vasodilator agents, nylidrin HCl and B-pyridylcarbinol were studied on gastric secretion in 57 patients ranging in age from 20-40 yr. None of the patients were suffering from any disease of the gastrointestinal tract. Basal gastric secretions were first collected and then 30 min. of the secretions following 2.5 mg of histamine. Nylidrin was admin. to 30 patients, 6 mg/6 hr. for 4 days with 5 mg i.m. the evening and morning preceding tests. B-Pyridylcarbinol was admin. to 27 patients 50 mg 8 hr. for 4 days with 100 mg i.m. the evening before and the morning of the test. Secretions were collected in the same manner before and after the period of drug admin. About 65% of the patients reported flushing heat headache, etc. when on the drugs. Of 30 patients receivin nylidrin, 21 were hyposecretors; 13 of these had improved acid levels following the drug, some to normal levels. Of 7 normal secretors, 3 showed higher acid levels. An improved response to histamine was shown by 14 of 19. Patients receiving B-pyridylcarbinol showed a similar response: 64% increased acid levels in basal state, 77% showed an improved response to histamine. With both drugs, patients that were resistant to histamine showed some response after therapy. Vasodilators are suggested as possibly of value in the treatment of hyposecretors due either to disease, old age, or constitutional reasons.

7806 THE EFFECT OF CORTISONE ON GASTRIC HISTAMINE CONTENT AND GASTRIC SECRETION IN PYLORUS LIGATED GUINEA-PIGS.

(E.) Heisler, S. (McGill U., Montreal, Canada) and E. M. Kovacs. Brit. J. Pharmacol. 29(3):329-334, 1967.

Male guinea pigs were fasted for 28 hr., the pylorus ligated under ether anesthesia and deprived of food and water until sacrificed (overdose of ether) 18 hr. later. Before respiration stopped, stomachs were ligated at the esophageal end, removed, and blotted dry on filter paper. The greater curvature was incised and the contents emptied into calibrated centrifuge tubes. The stomach was further opened along the greater curvature, examined for lesions, and extracted for histamine after 2-3 hr. Sixteen animals were inj. s.c. with 100 mg/kg cortisone daily for 10 days. The animals were killed 24 hr. after the final dose and histamine content of the whole stomach, or antrum and corpus, was determined. Av. histamine level in 11 cortisone-pretreated animals (6.64 μg/g) was significantly lower than that in 15 controls (10.20 μg/g). Av. contents of the

rum and corpus, which were the same in untreated
mals (9.92; 9.78 were equally and significantly
ered by cortisone pretreatment (6.64; 6.61).
ht received a single s.c. inj. of 100 mg/kg
ediately after ligation; 6 received this dose
ly for 3 days; 12 for 10 days. Compared with
trol pylorus-ligated animals, a single dose
ered av. gastric histamine content by 16.8%;
nj. by 29.9%; 10 inj. by 27.6%. Compared with
se controls (pH 4.08; free HCl 0.14 mEq; total
d 0.49 mEq), a single inj. produced a fall in
and a slight rise in free and total acidity
gastric juice (2.98; 0.38; 0.82). These
ects were augmented by 3 inj. (1.86; 0.65;
7) and further so by 10 inj. (1.78; 0.80;
1).

07 GASTRIC SECRETORY RESPONSES TO DRUGS AFFECTING ADRENERGIC MECHANISMS IN RATS.

) Bass, P. (Parke, Davis & Co., Ann Arbor,
ch.) and M. A. Patterson. J. Pharmacol. Exp.
er. 156(1):142-149, 1967.

series of vasoactive or adrenergic drugs was
aluated for effects on gastric secretion in
lorus-ligated rats. Dose levels (mg/kg body
.) were calculated on the basis of content of
tive moiety; admin. was by s.c., i.v., or
traduodenal inj. Those with s.c. or intra-
odenal inj. at time of ligation were sacrificed
hr. later. Results of replicated experiments
re pooled and data tabulated for each drug,
sp. Vol. of secretion/100 g body wt. was
lculated. The value for 50% reduction of
cretion (ED$_{50}$) was calculated graphically from
plot of percentage secretion against mg/kg
se, and relative potencies of drugs inj. were
ferred from ED$_{50}$ values. Drugs with a s.c. ED$_{50}$
ss than 10 mg/kg in rats were considered potent
tisecretory agents. Peripheral vasoconstrictors
vasodilators had no consistent effect on
cretion. Vasoconstrictors such as norepinephrine
D$_{50}$ 0.25), epinephrine (0.28) and vasopressin
.26) were antisecretory, while angiotensin and
-dihydroxy phenylalanine had no effect. Of the
sodilators, isoproterenol (0.36) was antisecre-
ory, while bradykinin had no effect. Most
drenergic blocking agents were weakly antisecre-
ory. Drugs preventing catecholamine uptake were
ntisecretory and were more potent than those
reventing catecholamine release. Little effect
secretion was exhibited by sympathomimetic
mines with indirect or mixed actions or by
nhibitors of catecholamine metabolism. No effect
gastric secretion was exhibited by compounds
hat interfere with catecholamine synthesis by
nhibition of dopamine-β-hydroxylase or decarboxy-
ase enzymes. Catecholamines exerted a gastric
ntisecretory effect in the rat independent of
asoactive properties. It is concluded that
rugs which increase the biological half-life
f catecholamines decrease gastric secretion.

808 BALANCE OF THE GONADOTROPIC AND GASTRIC ANTISECRETORY ACTIVITIES IN THE PURIFICATION OF UROGASTRONE.

(E.) Lugaro, G. (U. Milan, Italy), M. M. Casellato and E. Crespi. Folia Endocr. (Roma) 19(3):378-390, 1966.

Gastric antisecretory activity measured by inhibition of gastric secretion following pyloric ligation in rats and gonadotropic activity evaluated on impuberal male and female rats by the method of Lugaro *et al.* were determined for various fractions of urogastrone. After gel filtration on Sephadex G-25 the gastric antisecretory activity was restricted to a single fraction, which, however, still possessed gonadotropic activity. Treatment of this extract with 1 M formic acid preceding gel filtration on G-100 yielded a fraction designated Ug G-100 possessing 31,000 antisecretory U/g (one U/100 g body wt. i.v. inhibited gastric secretion 50%) with an excellent yield. The substance appeared to be homogeneous to electrophoretic and ultracentrifugal methods in 1 M formic acid, but not in alkaline soln. (2 components, S = 5.59 and 1.89). The gonadotropic activity was retained by Ug G-100. The hypothesis that gonadotropic activity is linked to the integrity of the urogastrone molecule is rejected.

7809 GASTRIN-LIKE PENTAPEPTIDE I.C.I. 50 123: A POTENT GASTRIC STIMULANT IN MAN.

(E.) Konturek, S. J. (First Int. Dis. Clin., Cracow, Poland). Amer. J. Dig. Dis. 12(3):285-292, 1967.

Studies were carried out on 12 normal controls, 8 patients with duodenal ulcer, and 5 duodenal ulcer patients undergoing vagotomy and pyloroplasty. Continuous suction was used to collect gastric secretions by Levin tube. Collections were made before and after admin. of ICI 50, 123, 6 μg/kg s.c. or 0.024-6 μg/kg/hr. i.v. Histamine 40 μg/kg s.c. or 10-40 μg/kg/hr. was admin. for comparative purposes. The gastrin-like pentapeptide ICI 50, 123 was a more effective stimulant of gastric secretion in man than histamine and produced a max. acid output at 1.2 μg/kg/hr. i.v. or 6 μg/kg s.c. Atropine (1 mg s.c.) reduced pentapeptide- or histamine-induced acid secretion by 48 and 27%. After vagotomy a standard dose of pentapeptide produced an acid output 45% less than preoperatively. Histamine response was reduced by 30%. These data suggest that cholinergic innervation plays an important role in the effect of pentapeptide on gastric secretion. It is concluded that the gastric secretory test with pentapeptide has an advantage over other secretory methods insofar as it provides a reproducible, safe, and physiological stimulation of the stomach.

7810 COMPARATIVE EFFECTS OF GASTRIN II AND HISTAMINE ON PEPSIN SECRETION IN MAN.

(E.) Makhlouf, G. M. (Western Gen. Hosp., Edinburgh), J. P. A. McManus and W. I. Card. Gastroenterology 52(5):787-791, 1967.

Seven subjects (3 duodenal ulcer, 2 gastric ulcer, 2 normal) were each tested on separate occasions with histamine (40 μg/kg) or gastrin II (1 μg/kg), admin. s.c. Two 20-min. basal samples (spontaneous secretion) were collected prior to each test. Stimulated secretion was collected every 5 min. for 80 min.; eight 10-min. samples were collected for analysis. Following both gastrin and histamine, peak vol. and acid outputs occurred simultaneously at 30-50 min. Av. vol. and acid output during the hr. following stimulation were similar for both. After both, pepsin rose to an early peak at 15-20 min., but declined more rapidly with histamine. In each subject, both peak output and 1-hr.-output were significantly higher after histamine than gastrin; av. rise was 4-fold with histamine, 3-fold with gastrin. Output pattern of nitrogen followed that of pepsin; in all but 1, output after histamine (3-fold) was higher than that after gastrin (2-fold). After a short-lived initial rise, conc. of pepsin fell rapidly with gastrin, more slowly with histamine, to a level equal to half the basal conc. Nitrogen varied inversely with acid which rose quickly to a plateau. Basal acid output correlated with stimulated acid output and with basal pepsin output, and the latter correlated with stimulated pepsin output. Pepsin output, although 30% lower after gastrin, was highly correlated with corresponding pepsin output after histamine. Pepsin outputs on stimulation also correlated with corresponding acid output. Amount of pepsin secreted with each mEq of acid was higher under basal conditions (3.3 kU) than after histamine (1.1 kU) or gastrin (0.8 kU). Nitrogen outputs after gastrin correlated with corresponding output after histamine. Amount of nitrogen accompanying secretion of 1 mEq of acid was higher under basal conditions (13.3 mg) than after histamine (3.1 mg) or gastrin (2.3 mg).

7811 THE RELATIVE EFFECT OF AN ANTICHOLINERGIC DRUG, GLYCOPYRROLATE, ON BASAL GASTRIC SECRETION AND SWEAT- AND SALIVARY-GLAND ACTIVITY. (E.) Juniper, K., Jr. (U. Arkansas Med. Ctr., Little Rock). *Amer. J. Dig. Dis.* 12(5):439-448, 1967.

The fingertip sweat gland count and the salivary flow technics were used. For gastric analysis, a Levin tube was placed in the stomach under fluoroscopic monitoring after an 8-10 hr. fast; the fasting contents of the stomach were removed by hand aspiration, and the tube was connected to a suction pump with intermittent automatic release of vacuum; after a 30-min. equilibration period, fractions were collected at 20-min. intervals, and vol., pH, and acid content were measured. Subjects were 5 experimental volunteers with hyperchlorhydria by betazole testing; they were not then receiving drugs known to affect gastric secretion; a minimum of 2 days elapsed between tests in a given patient. Dose levels tested were selected as the study progressed; after an initial s.c. dose of 0.20, followed by 0.10 mg of glycopyrrolate, both high and low doses were tested. After a control period of 2 hr., the test dose was given i.m. and observatio were continued until the period of peak drug effect had passed. Subjects were followed for 3-5 hr. after drug admin. Placebo was 0.9% NaCl; test doses of glycopyrrolate were 0.02, 0.05, 0.10, 0.20, 0.30 mg. Both tests (fingerti sweat gland, salivary flow) were reliable indicators of glycopyrrolate effect, but the sweat gland test was more reproducible and sensitive than the salivary flow technic. Glyco pyrrolate had a significantly greater suppressiv effect on basal gastric secretion than on sweati or salivary flow. The subjective symptom of dry mouth correlated well with sweat gland activity and salivary flow. Both tests are concluded to be useful objective measures of side effects in the evaluation of anticholinergics in gastric secretion.

7812 ENERGY SOURCES FOR GASTRIC SECRETION: SUBSTRATES. (E.) Alonso, D. (San Francisco Gen. Hosp., Calif.), K. Nigon, I. Dorr and J. B. Harris. *Amer. J. Physiol.* 212(5):992-1000, 1967.

A thorough study of the utilization of exogenous and endogenous substrates seemed to be a prerequisite to studying the effects of adenosine-3',5'-phosphate on the metabolism of amphibian gastric mucosa *in vitro*. Water-soluble salts of short- and medium-chain fatty acids and ketones stimulated acid secretion and respiration. Lesser stimulation was produced by long-chain fatty acids complexed to albumin. Amino acids and intermediates of glycolysis did not affect acid secretion or respiration except for a small enhancement by pyruvate. However, exogenous glucose and pyruvate inhibited glycogen breakdow and increased lactic acid formation. The principal limitation to carbohydrate utilization appears to lie somewhere in the steps whereby pyruvate is converted to either acetyl-coenzyme A or oxalacetate. Histamine enhanced glycogenol sis in mucosa incubated in chloride soln. but not in glucuronate soln., showing that utilization of endogenous glucose contributed directly to the secretory process. The lipid content of serum and mucosa constituted a significant source of energy. Mucosal triglyceride and glycogen content decreased with incubation. The respiratory quotient varied between 0.7 and 1.0 in different mucosae.

7813 EVALUATION OF THE CEPHALIC PHASE OF GASTRIC SECRETION: COMPARISON BETWEEN SHAM FEEDING MEAT AND TEASING WITH MEAT ON CANINE GASTRIC SECRETION. (E.) Schapiro, H. (U. Tennessee Med. Units, Memphis), L. D. Wruble, L. G. Britt and S. R. Evans. *Amer. Surg.* 33(5):398-400, 1967.

Six dogs were prepared with esophagosotomies and gastric cannulae; 2-3 wk. after surgery, these 24-hr.-fasted dogs were restrained in

fied Pavlov frames; gastric secretion was
ected and vol. and acidity were measured;
dog served as its own control. In 1 series
20 experiments (Group 1), the dogs were sham-
a meat meal for 15 min., and gastric juice
collected every 15 min. for 2 hr. In Group
20) the dogs were teased with meat for 15 min.,
gastric juice was again collected every 15 min.
2 hr. Three other dogs were prepared with
tric cannulae; in 8 studies they were fasted
48 hr. and then teased with meat; gastric
ce was collected every 15 min. for 1.5 hr.
Group 2, after a latent period of 5-10 min.,
re was a sharp increase in gastric secretion
t lasted 30-45 min.; in 11, gastric secretion
rply increased in each dog and remained
vated for over 2 hr. The av. total acid output
hr. in Group 2 was 56-75% of that in Group 1.
sing dogs with meat after a 48-hr. fast did
evoke a longer or greater response than that
n dogs fasted only 24 hr. The minimum value
each trial in Group 1 was greater than the
. value obtained in any trial in Group 2.

4 EFFECT OF TRUNCAL VAGOTOMY ON ACID AND
PEPSIN RESPONSES TO HISTAMINE AND
TRIN IN DOGS. (E.) Emås, S. (VA Res. Ctr.,
Angeles, Calif.) and M. I. Grossman. Amer.
Physiol. 212(5):1007-1012, 1967.

d and pepsin secretion in response to graded
es of histamine and hog gastrin extract was
died before and after truncal vagotomy in dogs
h gastric fistulas. Before vagotomy histamine
gastrin produced the same max. rate of acid
retion. Truncal vagotomy shifted the dose-
ponse curves for both histamine and gastrin
the right; max. responses were unaltered but
ger doses were required. Before vagotomy max.
sin response to histamine occurred with a
dose that produced submaximal acid response;
her doses depressed pepsin secretion. Max.
sin response to gastrin occurred with a dose
t produced nearly max. acid response. Truncal
otomy shifted the dose-response curves for
sin to the right, reduced max. pepsin response
histamine but did not alter that to gastrin.
ncal vagotomy reduced the responsiveness of
gastric glands to both histamine and gastrin
regard to both acid and pepsin secretion.

5 SODIUM PENTOBARBITAL DEPRESSION OF
HISTAMINE- OR INSULIN-STIMULATED
TRIC SECRETION. (E.) Powell, D. W. (U.
bama Med. Ctr., Birmingham) and B. I.
schowitz. Amer. J. Physiol. 212(5):1001-1006,
7.

retion of H, Cl, Na, K, and pepsin, stimulated
infusion of histamine (1 mg base/hr.) and
ulin (10 U) was studied in 5 dogs with gastric
nulas during sodium pentobarbital anesthesia
mg/kg) and also in the unanesthetized state.
tamine-stimulated water secretion was inhibited
by sodium pentobarbital which produced
suppression of vol. but not of H or Cl conc. and left the hyperosmolality of gastric juice relative to plasma (1.03) unchanged. These findings were interpreted as representing a reduction in the number of actively responding parietal cells, but not in the responsiveness of each cell, possibly by a reduction in effective mucosal blood flow. Despite an equivalent degree of hypoglycemia, the gastric juice vol. response to insulin was much more strongly (77%) inhibited, and not only vol. but also the conc. of H was depressed. Pepsin secretion was inhibited similarly by sodium pentobarbital regardless of the stimulus. These findings suggest a more direct and probably vagolytic effect of sodium pentobarbital on the hypoglycemic stimulus, to which must be added the direct electrolyte inhibiting effect of insulin and the nonspecific sodium pentobarbital effect typified by the histamine results.

7816 ALTERED THYROID FUNCTION IN THE RAT. EFFECTS ON GASTRIC SECRETION AND VITAMIN B_{12} METABOLISM. (E.) Biggs, J. C. (Radcliffe Infirm., Oxford, England) and L. J. Witts. Gastroenterology 52(3):494-504, 1967.

Hyperthyroidism was produced in rats by means of sodium-l-thyroxine (1 ml/liter in drinking water) and hypothyroidism by means of carbimazole (0.05% in drinking water). Studies of gastric secretion in response to max. histamine stimulation (histamine acid phosphate 50 mg/kg s.c.) performed at up to 230 days revealed no significant change in gastric acidity of the hyperthyroid rats, whereas in the hypothyroid rats there was a temporary increase in gastric acidity followed by a return to normal. In the absence of histamine stimulation, a significant fall in the conc. and output of acid was noted in the hyperthyroid rats. A slight polycythemia was observed in the hyperthyroid rats and a normochromic normocytic anemia in the hypothyroid rats. Vitamin B_{12} absorption was normal in the hyperthyroid animals and reduced significantly in the hypothyroid group. This was found to be due to a disturbance in intestinal absorption, as the intrinsic factor activity of these rats was normal. Long-term hyper- and hypothyroidism had no effect on the histology of the gastric mucosa.

7817 EFFECT OF LOCAL GASTRIC TRAUMA ON GASTRIC RESPONSE TO HISTAMINE STIMULATION. (E.) Milton, G. W. (U. Sydney, Australia), F. O. Stephens, R. Maletz and G. A. Maxwell. Amer. J. Dig. Dis. 12(5):456-464, 1967.

The effect of injury on the gastric mucosal response to histamine stimulation has been investigated in dogs by 2 technics. On exposing the intact surface of the stomach to several kinds of trauma, e.g., friction, heat, salt, alcohol, and formalin. It was found that the surface of the traumatized area, in each instance, was coated with an alkaline surface of pH 7-9.

This alkalinization of the surface after trauma was not affected by submucosal infiltration of local anesthetic. Also, total gastric pouches in stimulated and unstimulated dogs were filled with ethanol (50% and 70%). In stimulated animals, the gastric secretory output of vol. and acid were considerably reduced. In nonstimulated animals, there was a transient rise in the vol. of gastric juice after ethanol instillation followed by a reduced output. However, the conc. of acid was low after ethanol admin. It is suggested that part of the explanation for these findings lies in the effect of injury on the secreting epithelium, this effect being physiologic and not associated with gross structural damage to the secreting cells.

7818 EFFECTS OF INDUCED HYPERCALCEMIA ON HUMAN GASTRIC SECRETION. (E.) Barreras, R. F. (U. Wisconsin Med. Sch., Madison) and R. M. Donaldson, Jr. *Gastroenterology* 52(4):670-675, 1967.

Hypercalcemia was induced in 24 peptic ulcer patients by i.v. admin. of Ca hexonate (in 0.9% saline; rate of 4 mg Ca/kg/hr., 3 ml fluid/kg/hr.). Mg (in saline) was admin. at 0.4 mEq in the single hr. of infusion, with a fluid delivery as above. Betazole (1.5 mg/kg), atropine (0.6 mg) and pentolinium (15-20 mg) were all admin. s.c. Basal acid output was the acid output in the hr. following the initial discard period (15-min. collection intervals followed an initial discard collection of 20 min.). Peak acid output was the max. 30-min. period, expressed as an hourly rate. Serum Ca and Mg were measured by atomic absorption spectrophotometry. Pepsin was measured by the hemoglobin substrate method of Anson and Mirsky. Hypercalcemia led to a marked increase in gastric secretion. Acid output rose to 12.2 mEq/hr., a rate which was 29% of the peak response to betazole and 4.5 times the basal acid output. Pepsin output rose to a rate which was 43% of the peak betazole response. Hypercalcemia failed to produce a significant alteration in the peak response to betazole. The inj. of atropine or pentolinium abolished the effect of hypercalcemia on the spontaneous gastric secretion, as did the concomitant induction of hypermagnesemia.

7819 CRITICAL EVALUATION OF THE ASSESSMENT OF MAXIMAL GASTRIC SECRETION STIMULATED BY HISTAMINE. (E.) Royle, J. P. (St. Bartholomew's Hosp., London) and B. N. Catchpole. *Brit. J. Surg.* 54(1):56-63, 1967.

Gastric secretion studies were made on normals and patients with duodenal and benign gastric ulcers. After a 12-hr. fast, Ryle's tube (to which were attached 2 fine polyethylene tubes for gastric inj.), was passed, under X-ray monitoring, so that its tip lay on the greater curvature of the stomach to the left of the vertebral column. Gastric secretion was withdrawn from the main lumen of the Ryle's tube and air was inj. down the distally opening side tube at 25 ml/min. Resting secretion was collected for 30-40 min.; i.v. inj. of a mixed soln. of hista acid phosphate 0.04 mg/kg/hr. and mepyramine maleate 50 mg/hr. was made with a slow infusion pump while maintaining continuous aspiration an concomitant air inj. When a max. rate of secre tion was reached, an intragastric infusion of dye-marked saline or $NaHCO_3$ was made at a rate double the vol. of aspirate, or raise its pH to 3.3; infusion lasted for 30 min. but histamine stimulation with gastric aspiration continued until acidity of aspirates returned to preinfus levels, approx. 15 min. In the 67 patients, th acid conc. and vol. of aspirated secretions ros to a max. and plateaued. Acid recovery rose to a max. when conc. and vol. of recovered secr tions both reached a max., but time varied betw patients. Vol. reached a max. before acidity i 36, simultaneously in 17, afterwards in 14. Variation in acidity from sample to sample was less than 5% in 66; av. variation in vol. was 19%. There was some correlation between duoden pH changes and variation in vol. recovery. In saline infusion (9), the net vol. of secretion recovered was always less than that before sali infusion when histamine alone was inj.; in 5, the acid recovered was greater than with simple histamine inj. at its max., despite the reducti in net vol. recovered. In 6, the total amount of dye recovered from the stomach during and after inj. was 68-90%. In the bicarbonate infusion (34), the net vol. was lower than with histamine alone, in 32 being more than 10% lowe in 22; dye recovery in 19 was 60-97%. Continuo inj. of histamine and an antihistamine, rather than a single inj., permits the period of max. secretion to be recognized and measured whether it occurs early or late. Pooling of secretion in the stomach can be recognized when a prolong histamine stimulation is used. The possibility of intermittent or continuous pyloric loss of acid secretion, especially in hypermotile stoma which is present in any method of stimulation o gastric-secretion may result in a serious under estimate of secretory capacity. With continuou histamine inj. and intragastric titration by alkali, parietal cell output can be measured whether pyloric loss is occurring or not.

7820 HORMONAL STIMULATION OF NECTURUS GASTRIC MUCOSA *IN VITRO*. (E.) Shoemaker, R. L. (U. Alabama Med. Ctr., Birmingham) B. I. Hirschowitz and G. Sachs. *Amer. J. Physi* 212(5):1013-1016, 1967.

The mucosa (with muscle layers removed) of *Necturus* stomach was mounted in a modified Ussing flux chamber. The following were measur acid secretion, potential difference, short-circuit current and resistance. The nutrient soln. contained (in mmoles/liter): Na, 102; K, 4; Ca, 1.7; Mg, 0.8; Cl, 91; HCO_3, 18; HPO_4, 1; glucose, 10 mM. Secretory soln.: Na, 100; K, 4; Cl, 104. For Cl-free experiments, SO_4 was

tituted; for Na-free, choline. In 16 of 19
arations, no spontaneous secretion was obtained
he resting state, which was maintained in-
nitely. Addition of gastrin pentapeptide
^{8} M) or histamine (10^{-4} M) caused a stimula-
and onset of secretion, with a rise in
ntial difference and short-circuit current
a variable response in resistance. Max.
etion was obtained with 0.013 µg/ml gastrin.
tion of 10^{-7} M methacholine resulted in a
ntial difference spike. With secretion
blished by gastrin, methacholine resulted in
ansient spike of potential difference and a
in acid rate. Anoxia and SCN both suppressed
rate within 15 min., but only anoxia sup-
ssed the potential difference. Substitution
la by choline resulted in an inverted potential
ference dependent on maintained acid rate; SO_4
lacement of Cl resulted in a fall of potential
ference and zero acid rate. The differences
lecturus gastric mucosa from other *in vitro*
parations are stressed.

QUANTITATIVE EVALUATION OF INTRINSIC
FACTOR FOLLOWING STIMULATION OF THE
TRIC MUCOSA BY PROTEIN HYDROLYZATE. (It.)
a, S. (U. Bologna, Italy), F. Possati and
Fiore. *Haematologica* 51(11):897-904, 1966.

effects on gastric secretion of intrinsic
tor of the admin. by stomach tube of 50 ml
gelatin hydrolyzate (450 mg of a mixture of
no acids obtained by enzymatic hydrolysis of
atin and 450 mg of proteast) were studied in
ormal subjects and 1 patient with duodenal
er (6 men and 4 women; age 17-62 yr.). Samples
gastric juice were obtained every 15 min.
r a 1-hr. period following stimulation. Assay
intrinsic factor was performed according to
Aderman-Chanarin radioimmune method using
i-intrinsic factor antibodies, ^{58}CO-B_{12}, and
ivated charcoal. Total vol. of gastric juice
nged from 9-43 ml before, and 79-310 ml after,
imulation. Free acid content ranged from
00693-0.65 mEq/hr. before and 0.007-22.44
q/hr. after stimulation. Secretion of intrinsic
ctor ranged from 9.13-52.6 U/ml before and
.6-75.34 U/ml following stimulation. Standard
viation for intrinsic factor values before
imulation av. 588.2 ± 368.44, after stimulation
14 ± 4647.6. The above values pertain to
rmal subjects and indicate that protein
drolyzate increases both total acid and intrinsic
ctor secretion. In the patient with duodenal
cer, values of total vol. of gastric juice,
ee acid content, and intrinsic factor content
re 60 ml, 0.37 mEq/hr., and 38.62 U/ml, resp.,
fore stimulation and 259 ml, 4.67 mEq/hr., and
.6 U/ml, resp., after stimulation. No correla-
on was observed between free or total acid
d intrinsic factor. Secretion of intrinsic
ctor was highest in patients with higher basal
values, although a very high secretion was
served in a patient with basic pH, probably
ecause of abundant alkali duodenogastric
eflux.

7822 INFLUENCE OF SALINE DIURETICS ON GASTRIC SECRETION IN CARDIAC DECOMPENSATION. (It.) Piedimonte, L. (A. Cardarelli Civil Hosp., Campobasso, Italy). *Minerva Med.* 58(28):1219-1222, 1967.

The effects of a saline diuretic on gastric secretion were studied in 18 patients (10 men and 8 women) with decompensated heart disease and moderate-to-marked edema. Patients were subjected to the following tests at the time of hospitalization, 1 wk. later, and 2 wk. later (or less if dismissed earlier): "Gastrotest" for gastric acidity, urinary chlorides, body wt., urine vol. Patients were kept on low-salt diets and treated with hydrochlorothiazide (p.o.; daily dose not stated). Regression of edema was good-to-marked in 9 patients, slight-moderate in 8, and absent in 1. Increase in gastric acidity was good-marked in 8 patients, slight-moderate in 7, and not present in 1. Results seem to indicate that restoration of the blood supply in the wall of the stomach restores the vitality of the secretory cells enhancing their acid-secreting activity. The mechanism by which acid secretion of the stomach is increased by diuretics, such as hydrochlorothiazide, which inhibit carbonic anhydrase is discussed.

7823 STIMULATION OF SECRETING CELL MASS BY SUBMUCOSAL LYMPH FROM GASTRIC ANTRUM IN DOGS. (E.) Reynolds, B. L. (Radiat. Res. Ass., Dallas, Tex.). *Amer. Surg.* 33(4):352-358, 1967.

Stomachs of narcotized dogs were opened along the greater curvature from the pylorus to the esophageal inlet. Without removing the mucous covering, India ink was inj. into the antral submucosa. The antral region was perfused with alkaline soln. at pH 8. Within 20-30 min., the dye outlined vessels below the flat, non-folded antral mucosa, directed radially from the site of inj. towards the rugae-containing corpus or secreting cell mass; inj. was repeated in the fundus and direction was established towards the corpus. Direction of flow of submucosal lymph agreed with schemes of extrinsic drainage (Coller, Griffith). A second study used methyl orange in alkaline soln. (orange-yellow above pH 4.4, red below); the yellow soln. was inj. in the distal antral submucosa and immediately the distal half of antral mucosa was overlain with an alkaline soln. of NaOH at pH 8; within 15 min., red appeared at the mucosal surface of the antral-corpus margin and spread through the distal corpus; fundal inj. of methyl orange soln. followed by alkaline perfusion did not produce red coloration in the corpus. In histological sections from the India ink preparations, the dye extended from the submucosa to the mucosa, between the gastric glands, clearly demonstrating the presence of dye in the interstitial tissue, if not in the lymph channels. Using extremity cannulation and alkaline perfusion of the open antrum, approx. 5.0 ml of submucosal fluid was collected from 10 dogs. This was inj. into the left ventricle of a dog with a Heidenhain and a main gastric pouch. Acid response from the pouches occurred within 3-5 min., with a peak at 10 min. An intrinsic gastric mechanism for secretory control is proposed, with the suggestion that extragastric neuronal, glandular, and vascular substances modify such control.

7824 GASTRIC ACID OUTPUT AND CIRCULATING ANTI-BOVINE SERUM ALBUMIN IN ADULTS. (E.) Kraft, S. C. (Scripps Clin., LaJolla, Calif.), R. M. Rothberg, C. M. Knauer, A. C. Svoboda, Jr., L. S. Monroe and R. S. Farr. Clin. Exp. Immun. 2(3):321-330, 1967.

Analysis of acid secretion was made in 241 gastrointestinal patients (16-84 yr., av. 48.2) as part of a complete gastrointestinal study or as control values for an unrelated study. Augmented histamine tests were performed (Kay). Fasting gastric contents were discarded and four 15-min. basal specimens were collected by intermittent suction. Saliva was removed by constant dental suction. After the second 15-min. sample, 100 mg diphenhydramine HCl was inj. s.c. After the fourth specimen, 0.4 mg/kg histamine phosphate was inj. s.c. and 4 more 15-min. samples were collected. A fasting venous blood sample was taken at time of each gastric analysis, sera were stored at -20° C and studied in duplicate for antibovine serum albumin (Barrick and Farr). In those 16-40 yr. old (71), the percentage of high, normal, and low acid secretors with antibovine serum albumin were 13%, 29%, and 13%, resp., while in those above 41 (171), they were 34%, 22%, and 15%. Further demonstration of the relationship between high gastric acid and high antibovine serum albumin was given by consideration of gastroduodenal disease and history of allergy. There was no correlation between the quantity and immunoglobin classes of antibovine serum albumin and the differences in gastric output or dietary history. Antibovine serum albumin activity could not be demonstrated in any of the 16 patients denying recent intake of bovine serum albumin. It is suggested that gastric acidity is one of many variables on which the capacity to maintain or reinitiate antibovine serum albumin production is dependent.

7825 EFFECT OF GASTRIN AND GASTRIC DISTENSION ON GASTRIC AND PANCREATIC SECRETION IN THE RAT. (E.) Chaitman, B. (McGill U., Montreal, Canada) and R. M. Preshaw. Canad. J. Physiol. Pharmacol. 45(3):558-561, 1967.

Rats were fasted for 24 hr. and under ether the common bile duct was cannulated with polyethylene tubing (external diameter 1.0 mm) and ligated just below the hepatic hilus. A flanged polyethylene tube (external diameter 6.2 mm) was tied into the forestomach to form a gastric fistula, and the pylorus ligated. The external jugular vein was cannulated with polyethylene tubing (external diameter 1.0 mm), connected to a constant infusion pump, and perfused with 0.15 M NaCl at 3 ml/hr. Experiments were performed on the third postoperative day. Gastric and pancreatic juice were collected hourly by gravity drainage. The latter was collected into tared microtubes and wt. of juice used to estimate flow rate. Gastric acid was measured by titration with NaOH. Pancreatic protein conc. was measured spectrophotometrically against bovine serum albumin. Pancreatic protein output can be used as an index of total enzyme output since the protein content of pancreatic juice is almost entirely enzymatic. Gastrin was admin. at 4 dose levels (0, 8, 16, 32 Leo U) by single i.v. inj. at 2-hr. intervals. A baseline collection was made 1 hr. before inj. and results were expressed as per cent of basal response. Controls received an equivalent vol. of saline i.v. In other experiments a Latex balloon was introduced into the stomach through the gastric fistula and connected to a vertical glass tube containing water to a height of 15 cm above the animal. Commercial (Leo) and prepared (after Gregory and Tracy) gastrin caused similar increases in gastric acid and pancreatic protein output, but neither produced a change in pancreatic flow rate. Control experiments showed that rates of gastric and pancreatic secretion were fairly constant. This confirms that gastrin is an effective stimulant of gastric acid secretion in the conscious rat. Extract of secretin caused an increase in pancreatic flow rate and protein output and a decrease in gastric acid secretion. The experimental pancreas was capable of responding with an increase in flow rate after an appropriate stimulus. This suggests that gastrin had no effect on flow rate. Gastric distention caused a small increase in gastric acid output and a transient rise in pancreatic protein output. Gastrin-induced stimulation of acid secretion and pancreatic protein output suggests that a gastric phase of pancreatic secretion exists in rats.

7826 THE FINE STRUCTURE OF GASTRIC EPITHELIAL CELLS IN THE SUCKLING RABBIT WITH PARTICULAR REFERENCE TO THE PARIETAL CELL. (E.) Hayward, A. F. (Roy. Dent. Hosp., London). Z. Zellforsch. 78(4):474-483, 1967.

A small segment of fundus of stomach was excised from rabbits at the following stages: before feeding with no milk present in stomach; 6 hr. after birth, stomach distended with semifluid milk; on the second and fifth postnatal days. Specimens were fixed in buffered 1% osmium tetroxide; embedded in Araldite; thin sections examined by electron microscopy. pH of stomach contents and mucosal surface was measured with indicator paper. Immediately after birth, before feeding, the stomach contained a greenish mucous fluid and gas bubbles. At later stages, stomach contents consisted of partially clotted milk. pH of stomach contents was approx. 7, of

l surface 2-3. There was a reduction in
and change in distribution of smooth cyto-
c vesicles of gastric parietal cells of
n rabbits in comparison to those of the
erm fetus. The apical surface and intra-
ar canaliculus were more complex. It is
ted that these changes are indicative of
set of acid secretion. The remaining
l and submucosal connective tissue cells
l dilatation of endoplasmic reticulum and
lation of fat. By 5 days after birth, the
ecture of individual cells resembled that
lt cells.

EFFECT OF EXCLUSION OF BILE FROM THE INTESTINE ON GASTRIC ACID SECRETION.

Nahrwold, D. L. (VA Ctr., Los Angeles,
) and M. I. Grossman. Gastroenterology
:667-669, 1967.

dogs were prepared with a Heidenhain pouch
ed by a Gregory cannula, cholecystectomy,
Thomas cannula inserted into the duodenum
ite the opening of the common bile duct.
mized tests began 3 wk. after operation.
sts without diversion of bile to the exterior,
uodenal cannula was not opened. In "diver-
tests, the cannula was opened and a poly-
ene tube inserted about 5 cm into the common
and brought out through a small hole in a
inserted into the duodenal cannula to prevent
ge of duodenal contents. Experiments began
is time. Gastric juice was collected con-
usly from the Heidenhain pouch in 15-min.
es; vol. and acid conc. were determined;
was collected continuously in 15-min.
es and vol. measured. In all tests, 80 g of
rated dog food was given after collection
sal gastric secretion for either 1 or 3 hr.
ntire series of tests was repeated except
75 U of secretin was admin. i.v. 1 hr. after
ng when the gastric secretory response was
near peak. When bile was not excluded from
ntestine, secretory responses from the
nhain pouches were the same in 1- and 3-hr.
gastric juice collection tests. When food
iven 1 hr. after cannulation of the common
the acid secretory response was not signifi-
y different from tests without exclusion of
; when food was given after 3 hr., the gastric
tory response was markedly lower than after
(differences in acid output were significant
nning 30 min. after feeding). Secretin (1
after feeding) inhibited gastric acid secre-
, stimulated by a meal, to the same degree
bile was excluded as when it was not. The
ence of bile in the intestine is a factor
n contributes to the regulation of gastric
etion; inhibition of gastric secretion by
etin is unaltered by removal of this factor.

STUDIES OF RESTING ISOLATED FROG GASTRIC MUCOSA. (E.)

Kasbekar, D. K.
California Sch. Med., San Francisco). Proc.
Exp. Biol. Med. 125(1):267-271, 1967.

Mucosae of Rana catesbeiana, stripped from their smooth muscle, were mounted between chambers (by the Durbin technic), and all stomachs, 2.85 cm^2 in area, were incubated overnight in 14 ml each of histamine-free nutrient soln. on the submucosal side and 120 mM NaCl on the luminal side. The nutrient soln. was bubbled with a gas mixture containing 95% O_2-5% CO_2, and the secretory soln. with 100% O_2. Both the nutrient and NaCl soln. used in overnight studies contained 1 mg/ml each of streptomycin and penicillin. The acid secretory rate of mucosa incubated with histamine-free media decreased to a very low rate after approx. 16 hr., the potential difference increased and the short-circuit current declined. The addition of 10^{-4} M histamine to the nutrient medium bathing the serosal side restored acid secretion to approx. 80% of the initial rate; there was little change in potential difference and there was an increase in short-circuit current. No difference existed in the ATPase activity of the resting and histamine-stimulated mucosa; the ATP level of the stimulated mucosa, however, was slightly greater that that of the resting mucosa. The procedure of preincubation of the mucosa in histamine-free media has made it possible for the first time to reproducibly obtain resting mucosae which can be stimulated by added histamine.

7829 STUDIES OF GASTRIC HYDROCHLORIC ACID SECRETION IN PERNICIOUS ANEMIA: THE VALUE OF NEAR-MAXIMAL STIMULATION TECHNICS. (E.)

Wenger, J. (Emory U. Sch. Med., Atlanta, Ga.), I. Backerman, J. Steinberg and B. R. Gendel. Amer. J. Med. Sci. 253(5):539-548, 1967.

A total of 54 patients with megaloblastic anemia were studied using near-max. stimulation of gastric acid secretion. Most were previously diagnosed as pernicious anemia by standard criteria, including the Schilling test. Others were current patients under investigation because of a megaloblastic anemia. Gastric stimuli used included reserpine HCl (1.0 mg admin. i.v. over a 30-min. period), betazole (0.5 mg/kg, after completion of the reserpine test) and histamine phosphate (0.04 mg/kg admin. s.c. for 30 min. after the admin. of 50 mg of diphenhydramine i.v.). Combined reserpine and betazole was used on 30 subjects, and 24 were tested with the augmented histamine test. A new criterion for achlorhydria was defined as the failure of gastric pH to fall 1.0 U or more, or the failure of gastric pH to fall below pH 6.0 when stronger stimuli were used. By these criteria 3 of 54 patients were found to secrete acid. Subsequent study showed that 2 of these had gastric intrinsic factor and therefore did not have pernicious anemia. Diagnosis in these 3 patients were non-tropical sprue, nutritional megaloblastic anemia and (probable) juvenile pernicious anemia. This study supports the concept that the secretion of HCl is an unusual finding in adult patients with pernicious anemia. It was also shown that the study of gastric acid secretion using a near-max. stimulus and including measurements of the gastric juice pH obtained is a very useful procedure in the study of a patient with pernicious anemia. The case histories of the 3 acid-secreting patients are described in detail.

7830 EFFECTS OF A SPECIFIC GASTRIN ANTAGONIST ON GASTRIC ACID SECRETION IN POUCH DOGS.

(E.) Bedi, B. S. (Western Infirm., Glasgow, Scotland), G. Gillespie and I. E. Gillespie. *Lancet* 1(7502):1240-1243, 1967.

The action of antigastrin, 2-phenyl-2-(2-pyridyl) thioacetamide, on the gastric acid responses in pouch dogs was studied; 3 dogs had vagally innervated pouches separated from the main gastric remnant by a double mucosal bridge and drained by a Gregory-type cannula, and 3 other dogs had Heidenhain-type vagally denervated pouches. The effects of antigastrin, given as single i.v. inj., were tested against gastric acid responses to the continuous constant-rate i.v. infusion of pentagastrin, pure gastrin II, histamine and the stable choline ester, methacholine; in addition, the effects of single i.v. inj. of antigastrin on the response to a standard meal were also studied. Antigastrin specifically inhibited the gastric secretory responses to both pure gastrin II and the synthetic gastrin-like polypeptide, pentagastrin. The agent had no effect on responses to histamine or methacholine. Antigastrin partially suppressed the gastric acid response to a meat meal in vagally innervated pouch dogs, and almost completely abolished the Heidenhain-pouch response to the meal. Since it is generally accepted that the meal response of the Heidenhain pouch is almost wholly mediated by gastrin release (whereas the control of acid secretion in the innervated pouch contains both vagal and gastrin components), this difference in the inhibitor behavior of the 2 pouches is additional support for the specific activity of antigastrin against gastrin-stimulated acid secretion. Propylene glycol had to be used to dissolve antigastrin, and it is advised that further control experiments with this organic solvent are necessary. The effective dose of antigastrin appeared to be 10 mg, but further, complete dose-response studies must still be done.

7831 EFFECT OF SECRETIN ON BICARBONATE SECRETION IN FLUID PERFUSING THE RAT ILEUM.

(E.) Hubel, K. A. (U. Iowa, Iowa City). *Experientia* 23(5):337-338, 1967.

The terminal 25 cm of small intestine in Sprague-Dawley rats of either sex was perfused with a soln. which contained the following components: NaCl, 102.8 mM/liter, KCl, 4.7 mM/liter, KH_2PO_4, 0.8 mM/liter $NaHCO_3$, 28.2 mM/liter, $MgCl_2 \cdot H_2O$, 1.2 mM/liter, glucose, 16.7 mM/liter and polyethylene glycol, 2 g/liter. The influence of i.v. secretin was determined by comparing the net electrolyte fluxes in the period after secretin admin. with those in the alternate period after i.v. saline. In Group 1, saline was inj. 5 min. after beginning the first perfusion period and secretin was inj. 5 min. after the start of the second. In Group 2, inj. were given in reverse order. Electrolyte fluxes determined were bicarbonate, Cl, Na and K. Single large i.v. doses of secretin failed to influence the net fluxes of any of the electrolytes in fluid perf ing the rat ileum. These results suggest that bicarbonate secretion in the ileum is controlle by a mechanism which differs from that of the pancreas and biliary tree.

7832 SECRETORY RATE OF GASTRIC ACID AND PANCREATIC BICARBONATE IN THE DOG AFTE FEEDING.

(E.) Rune, S. J. (U. Copenhagen, Denmark) and F. W. Henriksen. *Gastroenterology* 52(6):930-939, 1967.

The indirect method of estimating the rate of gastric acid secretion after a solid meal (450 g of lumps of raw or boiled pork heart, free fr any visible fat) was applied to 4 mongrel dogs, in which pancreatic juice was collected directly from the pancreatic duct. In all feeding experiments the meal gave rise to an increase in the blood buffer-base conc. without any discernible time lag. The rate of acid secretion during the first 30 min. after a meat meal was found to be the same as during the first 30 min. of a max. i.v. histamine infusion test; from this it was concluded that the two modes of stimulation are of equal intensity. The means of the secretory rates during stimulation with food and with histamine were, resp., 33 mEq/hr. and 31 mEq/hr. The pancreatic response was seen within 5 min. after the meal, with a peak bicarbonate output in the second or third 10-min. period. The pancreatic bicarbonate secretion in the first 30 min. after the meal was highly correlated with the gastric acid output in the same period, whil the ratio between the two secretions on an equivalent basis was: gastric acid to pancreatic bicarbonate = 6:1. No significant acid or base loss from the gastrointestinal tract other than the secretion of gastric acid and pancreatic bicarbonate was provoked in the early postprandi period.

7833 INHIBITION OF GASTRIC MUCOUS SECRETION BY ACTH. AN EXPERIMENTAL STUDY.

(E.) Desbaillets, L. (U. Chicago Sch. Med., Ill.) and R. Menguy. *Amer. J. Dig. Dis.* 12(6):582-586, 1967.

Dogs were prepared with vagally denervated antra pouches, and the rate of secretion and the biochemical composition of mucus secreted by the gastric antrum were studied before and during admin. of ACTH (5 U/kg). In 5 of 6 dogs the admin. of ACTH was accompanied by a decrease in mucus secretion, which ranged from 15-43% of control values. The overall change in the biochemical composition of the mucus secreted durin ACTH admin. was expressed as a decrease in the carbohydrate (total): protein ratio in the dry

substance. The conc. of sialic acid decreased
of 6 animals, L-fucose in 3 of 6, hexosamines
of 6 and hexoses in 4 of 6 animals. These
lts suggest that ACTH decreases the rate of
ric secretion of mucus and alters the composi-
of mucus in such a way that it may be more
ily digested; ulceration during admin. of
and during stress may be due to impaired
sal defense mechanisms.

INJECTION OF 5% PHENOL INTO SUBMUCOSA OF DENERVATED GASTRIC POUCH. (E.)

piro, H. (U. Tennessee Sch. Med. U., Memphis)
L. G. Britt. *Arch. Surg.* (*Chicago*) 94(6):
844, 1967.

dogs were prepared with denervated gastric
hes; after control values for total acid
ut were established for 0.1 and 1.0 mg (base)
istamine and for 200 and 400 g of dog food,
gastric pouches were exposed at laparotomy
5% phenol soln. was inj. throughout the
ucosa of each pouch. After a 4-5 wk. recovery
od, the gastric pouch was stimulated as before,
repeated at intervals up to 5 mo. In 2 animals,
ly denervated gastric pouches were constructed
5% phenol was inj. throughout the submucosal
on of 1 of each pair of pouches. These dogs
allowed 5-6 wk. to recover, and then gastric
e was stimulated with 0.1 and 1.0 mg (base)
istamine and 200 g of dog food; the studies
repeated at intervals up to 5 mo. In the
t group of animals, the gastric secretory
onse to 0.1 mg of histamine base was depressed
3%, and the gastric secretory response to
mg of histamine base was reduced 54-96%.
ric secretory response to 200 g of dog food
depressed 82-93%, and that to 400 g of food,
4%. In the 2 dogs with doubly denervated
ric pouches, gastric secretory response to
mg of histamine base in the phenolized pouches
depressed 86-91%, and that to 1.0 mg of
tamine base was reduced 81-87%. In these same
ches, the gastric secretory response to 200 g
dog food was depressed 62-80%. In both groups,
nolization of the submucosa did not reduce
number of parietal cells or change the
tological appearance of the gastric tissue.
ctivity of the parietal cell was not constant
it is assumed that acid secretion may be
irely blocked by a functional inhibition of
otherwise intact parietal cells. These experi-
ts suggest that the submucosal plexus of
ssner may be important in the control of the
ietal cell.

5 INSULIN DEPRESSION OF HUMAN GASTRIC SECRETION. (E.)

Schapiro, H. (U.
nessee Sch. Med., Memphis), A. J. Cummins and
D. Wruble. *Arch. Surg.* (*Chicago*) 94(6):881-
, 1967.

e effect of insulin on gastric secretion was
udied in 10 groups of patients composed of 69
jects; there were 11 controls, 20 with duodenal ulcer, 5 with subtotal gastrectomy (antrectomy), 4 with bilateral adrenalectomy, 6 with bilateral oophorectomy, 5 with bilateral orchiectomy, 3 with pancreatitis, 5 with diabetes mellitus, 3 with total thyroidectomy and 7 with bilateral thoracolumbar sympathectomy. After a 2-hr. basal period, 0.25 U/kg insulin was admin. i.v., and gastric juice was again collected for 3 additional hr. There was an inhibition of gastric secretory vol. in all patients; this inhibition began within 15 min. and lasted 15-45 min. In only a few cases was the acid conc. decreased. A decrease in total acid output was noted in every case. Neither the time of onset of inhibition nor the duration of the inhibition varied significantly between controls and those with duodenal ulcer, but there was a greater inhibition of gastric secretion in the ulcer group. In controls, total acid output before insulin av. 0.23 mEq/15 min. and after insulin, 0.09 mEq/15 min.; in duodenal ulcer patients, preinsulin values av. 0.71 mEq/15 min. and postinsulin values av. 0.13 mEq/15 min. The other groups had mean preinsulin values which ranged from 0.10-0.26 mEq/15 min., and mean postinsulin values which ranged from 0.04-0.13 mEq/15 min. Although the decrease in duodenal ulcer patients was greater, the ultimate total acid output was similar in all groups, thereby indicating that the final value was independent of the preinsulin total acid value. At the end of the period of inhibition, a phase of gastric hypersecretion began that lasted 2-3 hr. in all patients; both the vol. and conc. of acid were increased during this period of hypersecretion. It was not possible to postulate the exact mechanism of action of insulin in inhibiting gastric secretion.

7836 GASTRIC SECRETION DURING PREGNANCY AND LACTATION IN THE RAT. (E.)

Lilja, B. (U. Lund, Sweden) and S. E. Svensson. *J. Physiol.* (*London*) 190(2):261-272, 1967.

Gastric acid secretion was studied in female rats before, during and after pregnancy using different types of stomach preparation (whole-stomach fistula and denervated gastric pouch). During the same periods the histamine-forming capacity was determined in gastric mucosa and mammary gland. Gastrin, "Gastrin II" and histamine were used to stimulate secretion. In response to a test meal (a semisynthetic, histamine-free regimen), secretory responses to histamine or gastrin were unchanged or slightly increased during the first 2 wk. of pregnancy, while there was a decrease during the third wk.; the same pattern was noted in all pregnant rats. In rats with a whole stomach fistula, interdigestive acid secretion was increased during pregnancy and lactation. In rats with a denervated chronic pouch, secretory response to stimulation with gastrin and histamine was augmented during pregnancy and lactation. The histamine-forming capacity of the gastric mucosa was increased 2-3 fold during the final days of pregnancy and also during lactation. Histamine-forming capacity of the mammary gland was increased 2-3 fold during lactation as compared with the fully developed gland in pregnancy.

7837 RELATIONSHIP OF MAST CELL POPULATION AND ENDOGENOUS HISTAMINE CONCENTRATION IN THE CANINE STOMACH.

(E.) Molina, E. (U. Minnesota Med. Sch., Minneapolis), W. P. Ritchie, Jr., D. Grigg and W. H. Wangensteen. Proc. Soc. Exp. Biol. Med. 125(1):71-73, 1967.

The distribution of histamine and mast cells was assayed in the fundic, corporal and antral mucosa of the dog stomach; 12 areas from each of 4 stomachs were studied. Mast cell profiles of these areas showed the cell population to be similar in all mucosal areas, but the greatest number of cells occurred deeper in the glandular mucosa of the antrum than in the glandular mucosa of the fundus and corpus. In contrast to this, the amount of histamine in the antral mucosa (73.3 ± 4.9 µg/g) was roughly 50% of that noted in fundic and corporal mucosa (133.6 ± 1.4 µg/g); this difference was statistically significant. Proposed as an explanation of these findings is the hypothesis that there may exist a dual pattern of histamine storage in the gastric mucosa, i.e., the histamine present in the antrum may be bound to mast cells while the major portion of corporal and fundic histamine is more closely associated with the secretory cells themselves, possible bound by mucin.

7838 MORPHO-PHYSIOLOGICAL PROPERTIES OF GLANDS RELEASING HYPOTONIC SECRETIONS.

(Rus.) Krestinskaia, T. V. (Sechenov Inst. Evolutionary Physiol. and Biochem., Leningrad, USSR). Biull. Eksp. Biol. Med. 62(12):21-24, 1966.

Submaxillary and sublingual salivary glands, the spleen, and mammary glands of mature albino rats, as well as parotid glands of 6, 14 and 20-day-old puppies were analyzed histochemically. Acid mucopolysaccharides were found in the basic substance of the connective tissue membrane of interlobular ducts and especially in the basal membranes of salivary tubules. Acid mucopolysaccharides were absent from basal alveolar membrane and interpolar portions. The dehydration of succinic and α-ketoglutaric acids was most marked in the duct cells; dehydration of succinic acid was especially marked in cells of the salivary tubules. These enzymes were almost totally absent in alveolar cells and intrapolar portions. The intensity of dehydration of malic and isocitric acids in the cells of alveoli and ducts was similar and relatively small. The activity of succinic dehydrogenase in 6-day-old puppies, which at that time had no differentiated salivary tubules, was very low; at this time their saliva was isotonic with blood plasma. Hypotonic saliva appeared by the second wk. after birth, at which time differentiation of the salivary tubules was clear and enzymatic activity markedly increased. In spleen and mammary glands the acid mucopolysaccharides were found in the basic substance o
the connective tissue stroma in slight amount; they were absent in the basal membranes of the secretory portions and ducts. Dehydrogenase activity was similar in the alveolar and duct cells. In the spleen the intensity of dehydration, including succinic acid, was low, while i
mammary glands the activity of the latter was quite high.

7839 EFFECT OF FLOW RATE ON PAROTID FLUID CALCIUM, MAGNESIUM AND PROTEIN CONCENTRATIONS IN THE HUMAN.

(E.) Windeler, A. S. (Brooks Air Force Base, Texas) and I. L. Shanno
US Air Force Sch. Aerospace Med. SAM-TR-67-18: 1-5, 1967.

A vacuum-type metal collecting device was place
(with minimal manipulation) over the orifice of
the right Stensen's gland in 23 resting males (18-23 yr.) to obtain an unstimulated 2.0 ml sample. Each then gave 7 more samples in respo
to exogenous stimulation (in order): 0.2%, 0.4%, 0.8% citric acid; sour fruit drop; 0.8%, 0.4%, 0.2% citric acid. Acid was admin. by retention of 2.5 ml in the mouth without swallo
ing for 30 sec. After expectoration, swallowin
was permitted after a 30-sec. waiting period, t
whole procedure being repeated until 3.0 ml flu
was obtained. Test collection with each stimul
was preceded by a 5-min. waste sample to permit the gland to adapt and the device to clear. Ca
Mg and protein were measured and expressed as wt./vol., and a secretion rate was calculated, wt./time. Values for none and 7 exogenous stimulants were: flow rate (ml/min.), .036, .1
.42, .66, 1.1, .62, .51, .35; Ca (mg/100 ml),
4.46, 2.50, 2.56, 3.00, 3.78, 3.22, 2.86, 2.56;
Mg (mg/100 ml), .427, .085, .054, .044, .037,
.049, .057, .060; total protein (mg/100 ml), 34
182, 186, 223, 273, 237, 205, 207. A positive correlation existed between flow rate and Ca conc., and this increased when Ca was expressed in µg/min. Both values were significant and significant differences were found in coefficie
for different subjects. Mg conc. was negativel
correlated and variance in coefficients between subjects was insignificant. When Mg was calcul
ted in µg/min., the correlation was positive an
differences between subjects was significant. Protein conc. was positively related to flow rate and responses varied significantly between subjects. Mg conc. was negatively correlated with protein and responses varied significantly between subjects. Ca was positively related to protein, but there were significant differences between subjects. In view of inconsistencies between persons, one cannot predict with reliab
ity, an individual's Ca and protein conc. at a given flow rate.

7840 SECRETORY RESPONSES AND CHOLINE ACETYLASE OF THE RAT'S SUBMAXILLARY GLAND AFTER DUCT LIGATION.

(E.) Ohlin, P.

Lung, Sweden) and C. Perec. Experientia
):248-249, 1967.

right submaxillary duct was ligated in 28
le rats. Secretory responses to sialagogues
determined (1-4 wk. after ligation) in 15,
holine acetylase in 13. Rats were anesthetized,
axillary ducts cannulated. Amount of saliva
aring at the cannula tip was observed after
inj. of epinephrine (20 µg/kg), metacholine
µg/kg) and pilocarpine in increasing doses
m 50-1000 µg/kg) every 30-60 sec. until max.
retory response was reached. Choline acetylase
ivity in gland was determined 1 wk. after
ation. Gland wt. was markedly decreased after
ation (97 to 80 mg). Secretory response to
ephrine was 1 1/2 drops of saliva from
trols, and this decreased gradually for 6 days
er ligation until no secretion was observed.
trol values for methacholine were the same,
zero secretion was reached in 3 days. Max.
rate of control gland (4 drops/min.) to
ocarpine (total 1-5 mg) was decreased to less
n 1 drop/10-15 min. after ligation. One wk.
er ligation, the total enzyme activity was
iar in control and ligated glands, but enzyme
c. increased from 300-600 µg acetylcholine/hr./g
tone powder, corresponding to the decrease in
nd wt. Ligation atrophy of the submaxillary
nd is probably not due to changes in parasym-
hetic secretory neurones, since the activity
choline acetylase was unchanged after ligation
the duct.

1 SECRETION OF CALCIUM BY THE SALIVARY
GLANDS IN THE DOG. (E.) Bazerque,
M. (U. Buenos Aires Sch. Med. & Dent.,
entina), W. F. Neuman and E. J. Miller. J.
t. Res. 46(2):446-451, 1967.

e dogs received water only for 24 hr., then
e anesthetized with Na pentobarbital: sub-
illary and parotid ducts were exposed and
nulated with 4-5 cm polyethylene tubing
ternal diameter 0.028-0.038 cm). Salivation
stimulated electrically or by i.v. inj. of
ocarpine in various doses. Ca in serum, in
otid and submaxillary saliva, in both salivary
sues, and in ultrafiltrates of saliva and
rum was determined by fluorescent ethylene-
minetetraacetic acid titration. Ca conc. was
5 times higher in parotid saliva (7.3 mEq) than
serum (4.8). This was paralleled in ultra-
ltrates (parotid, 6.0; serum, 315), indicating
at the parotid was capable of concentrating
trafiltrable Ca. Values in submaxillary saliva
hole sample 4.6; ultrafiltrate 3.8) were
milar to serum. Tissue samples of glands were
ken before and after drug stimulation. Stimula-
on decreased Ca conc. by a third in the parotid
efore, 9.0; after, 6.4) and by half in the
bmaxillary (39.7; 20.0). After max. drug
imulation, salivary Ca conc. decreased with
me (av. 7.9 mEq/liter for the first 5 min.;
8 at 42 min.). With the use of radioactive
Ca-^{2}P, specific activity (cpm/mg Ca) varied with intensity of stimulation. At 8 mg/kg, whether ^{45}Ca was inj. (i.v. or i.p.) 15-30 min. before or 15 min. after stimulation of salivation, the specific activity of parotid saliva was similar to serum. At a dose of 0.3 mg/kg, there was a delay of more than 1 hr. before parotid saliva levels equalled those in serum. Specific activity of parotid Ca was constantly lower than that of serum or saliva, and reached a max. of 60% of serum values at 1-2 hr. after inj. of ^{45}Ca. In stop-flow experiments the cannula was clamped with a hemostat, and flow from the contralateral gland continued normally; after 2 min., the flow in the clamped cannula was reinstated and samples were collected at measured intervals. There was a decrease in specific activity and increase in Ca conc. in the first sample after resumption of flow. The opposite obtained in the contralateral side used as control. This suggests a greater participation of Ca stored in the gland, which has a lower specific activity than serum Ca.

7842 EFFECTS OF ISOPRENALINE TREATMENT ON SECRETORY RESPONSES AND RESPIRATORY ENZYMES OF THE SUBMAXILLARY GLAND OF THE RAT. (E.) Ohlin, P. (U. Lund, Sweden). J. Oral Ther. 3(3):190-193, 1966.

Of 36 rats receiving isoprenaline (7.5 mg in 0.2 ml saline) i.p. twice daily for 1 wk., 22 survived and were experimented on 48 hr. after the last inj. To estimate secretory response, rats were anesthetized and the submaxillary duct exposed and cannulated with a fine glass cannula. A series of doses of epinephrine (0.2-20 µg/kg), methacholine (0.02-10), and acetylcholine (0.02-20) were inj. i.v. to determine threshold doses and the secretory responses to above-threshold doses, recorded on a smoked drum. To estimate max. secretory response, pilocarpine was inj. i.v. every 30-60 sec., starting with 50 µg/kg and later at 100-200 µg/kg, until a max. flow rate was reached, usually 15 min. after a total dose of 3 mg/kg. Max. secretory response was expressed in µliter/min./gland or µliter/min./mg gland tissue (dry wt.). Treatment with isoprenaline caused a significant increase in both dry wt. (41.5 to 133 mg) and wet wt. (163 to 470 mg) of gland. With 9 control glands, threshold doses were: acetylcholine, 0.5-2.0; methacholine, 0.1-1.0; epinephrine, 0.0-2.0 µg/kg. After treatment, threshold doses of the first 2 decreased slightly (to below 0.5 and 0.1 µg/kg, resp., in 50% of rats) while that for epinephrine decreased (to 0.2-0.5 µg/kg) in 5 of 6. The effect of treatment on secretory response to above-threshold doses was best seen in estimation of max. secretory response to pilocarpine. Values per gland were 19 µliter/min. in controls and 16 in treated, essentially unchanged after pronounced gland enlargement. When calculated per U wt., values decreased significantly from 0.46 to 0.14 µliter/min./mg. With isoprenaline; total activity of succinic dehydrogenase increased 71%, although the conc. decreased 40%; activity of the fumarase and cytochrome oxidase remained constant, while the conc. of both decreased 60%. Increased sensitivity of the gland after isoprenaline, may be partly due to a retention of isoprenaline in subliminal conc.

7843 A MICROREFRACTOMETRIC STUDY OF THE SALIVARY GLANDS OF THE RAT AFTER LIGATION OF THE EXCRETORY DUCTS. (E.) Gerzeli, G. (U. Pavia, Italy) and E. Mira. Acta Anat. (Basel) 65(1-3):256-274, 1966.

The excretory ducts of the right submaxillary and sublingual glands of 9 adult albino rats were ligated under ether anesthesia while the left glands were used as controls. The dry mass of single cellular elements of the glands were studied 12, 24, and 36 days after ligation using microrefractometric technics. Cryostat sections unfixed or fixed in formalin or ethanol were observed with a Leitz interference microscope using glycerine or distilled water as the immersion medium. Ligation of the ducts produced characteristic modifications of the protoplasmic fractions, definable by their behavior with regard to histological fixation and washing with water during the course of atrophy over the 36-day period. In particular, 12 days after ligation, was the presence of an important protoplasmic fraction labile to fixation and washing. In the successive periods this fraction was reduced in the specific secreting elements in a much more distinct way than in the striated excretory ducts.

7844 METRECAL-INDUCED CHANGES IN HUMAN SALIVA. (E.) Hall, H. D. (U. Alabama Med. Ctr., Birmingham), J. J. Merig, Jr. and C. A. Schneyer. Proc. Soc. Exp. Biol. Med. 124(2):532-536, 1967.

Parotid and submaxillary saliva was collected from 8 male dental students at 8:00 in the morning following 8-10 hr. of abstinence from eating, drinking and smoking. Pilocarpine (0.1 mg/kg i.m.) was used as a stimulant. Two determinations were made on each subject, the first preceding a wk. when only liquid Metrecal and water were eaten. After the first wk. saliva was collected and a normal diet eaten for 1 wk. when saliva was again collected. A marked reduction in vol. and total protein and amylase content of parotid saliva occurred following a wk. of a Metrecal diet. Restriction of solid food caloric intake (900 calories/day) resulted in wt. loss, but saliva vol., amylase, and total protein did not differ from the values collected on an unrestricted solid diet. These changes in the functional status of the parotid gland in man are attributed to a reduction in the masticatory and, therefore, in the reflexly-mediated secretory stimuli to the gland. Submaxillary secretion was unaffected by the Metrecal treatment, possibly due to the difference in innervation.

7845 AN IN VITRO PREPARATION OF DOG PAROTID GLAND. (E.) Tanzer, J. M. (Nat. Inst. Dent. Res., NIH, Bethesda, Md.). Proc. Soc.
Biol. Med. 124(3):912-915, 1967.

Parotid glands excised from young pentobarbit
anesthetized dogs were diced and washed in Kr
Ringer soln. containing 200 mg% glucose at pH
7.4. The tissue was then placed in a similar
containing 400 mg% collagenase and shaken for
hr. at 25-27° C. The reduced tissue was wash
three times with fresh Krebs-Ringer soln. wit
glucose. The tissue's ability to conc. iodid
was investigated at the same time distributio
inulin was studied by incubation of washed ti
in Krebs-Ringer glucose soln. containing 0.9
μc/10 ml Na ^{131}I and 500 mg% inulin. Under a
conditions a corrected wet tissue/medium ^{131}I
ratio of 1.75 was observed showing accumulati
of isotope. Inulin space av. 49.3%. Anaerob
incubation reduced wet tissue/medium ^{131}I rat
to 1.04, inulin space of 49.3%. 10^{-3} NaCN fu
inhibited ^{131}I uptake producing a ratio of 0.
and an inulin space of 51.8%. The inulin spa
values for the 3 conditions were not signific
different. It is concluded that accumulation
131I by the preparation is depressed by anaer
sis and obliterated by cyanide. It is sugges
that this in vitro preparation might prove us
in the soln. of major issues in exocrine glan
physiology.

7846 A MICROPERFUSION INVESTIGATION OF S
RESORPTION AND POTASSIUM SECRETION
THE MAIN EXCRETORY DUCT OF THE RAT SUBMAXILLA
GLAND. (E.) Young, J. A. (Free U. Berlin),
E. Frömter, E. Schögel and K. F. Hamann. Pfl
Arch. Ges. Physiol. 295(2):157-172, 1967.

Capacity of the main excretory duct of the ra
submaxillary gland to transform a plasma-like
primary saliva into a low Na, high K, final s
was studied using a technic of continuous mic
perfusion. When the duct was perfused with
Ringers soln., there was a net efflux of Na a
smaller net influx of K, until steady-state
electrolyte conc. of 2.8 mEq/liter for Na anc
135 mEq/liter for K developed in the luminal
These changes were accompanied by a small net
water efflux that declined as the steady-stat
conc. were approached. The flux rates of wat
and electrolytes observed were sufficient to
account for changes in salivary composition
observed under free-flow conditions as precur
saliva passed along the main duct to the mout
Perfusion of the duct with Na-free soln. resu
in a net influx of Na to establish the same
steady-state Na conc. Net K influx also occu
although the rate of influx was reduced by mo
than 50% when compared with that observed dur
perfusion of the duct with Ringers soln. Mea
ment of transepithelial potential differences
associated with various intraluminal Na and
conc. showed an approx. logarithmic relations
between potential difference and the intralum
Na conc. The trans-epithelial potential diff
was approx. -70 millivolts (lumen negative) w
the duct was filled with Ringers soln., and

nillivolts (lumen negative) under steady- e (high K, low Na) conditions. Calculations he electrochemical potential gradients for nd K under steady-state conditions showed that of these cations underwent active transport. , K secretion was enhanced by a favorable trical gradient associated in some way with ve Na transport.

SECRETION OF BILE IN RESPONSE TO FOOD WITH AND WITHOUT BILE IN THE INTESTINE.

Nahrwold, D. L. (VA Ctr., Los Angeles, f.) and M. I. Grossman. Gastroenterology):11-17, 1967.

enterohepatic circulation of bile was inter- ed in 3 cholecystectomized mongrel dogs by rnal diversion of bile through a catheter in common bile duct. This diversion caused a ed reduction in the rate of bile flow, a ease in bile salt conc. and an increase in rbonate conc. Feeding with the enterohepatic ulation interrupted produced secretin-like eresis with increased bicarbonate conc. and ut; however, it did not increase the bile conc. or output. When bile was infused into duodenum, no increase in the vol. rate of flow ile occurred; however, the bile salt conc. output increased. Simultaneous feeding infusion of bile into the duodenum produced eresis characterized by high bile salt and arbonate conc., with bile salt output greater with bile alone and bile bicarbonate output ater than with food alone. The reason for reased bile salt output when food and bile e admin. simultaneously is not clear; possibly, reased intestinal motility which occurs during ding resulted in more rapid transport of infused e to the distal intestine where absorption urs, the presence of chyme facilitates the orption of bile salts, or endogenous production bile salts is increased under these circum- nces.

8 PANETH-CELL FUNCTION. (E.) Creamer,

B. (St. Thomas Hosp., London). Lancet 485):314-316, 1967.

patients with Paneth cell deficiency the most minent findings were a diminution of crypt ivity and damage to the epithelium of the ll intestine. Anatomical and secretory studies Paneth cells are reviewed and a hypothesis of ir function is proposed. It is suggested t the Paneth cells secrete a complex of protein carbohydrate which forms a luminal environment cessary for rapidly dividing and maturing cells for the epithelium on the villi. This mechan- n ensures an almost constant conc. of amino ids in the intestinal lumen, during both fasting d feeding, irrespective of diet. Paneth cells n be looked upon as specialized units providing minal nutrition for crypt cells and endogenous otein for the small intestine. The occurrence Paneth cells in intestinal metaplasia of the stomach may explain the high mitotic rate in this condition. Distal colitis is not accompanied by carcinoma while total colitis frequently is, and Paneth cells are rare in the sigmoid colon and rectum in this condition. An absence of Paneth cells in the small intestine is accompanied by abnormal crypts and surface epithelium which could well be explained by a lack of luminal nourishment.

7849 EFFECT OF NUTRITIONAL PATTERNS UPON THE PANCREATIC SECRETORY ACTIVITY. (Rus.)

Fomina, L. S. (Nutrition Inst., Acad. Med. Sci., Moscow). Vop. Pitan. 25(5):27-32, 1966.

Dogs (3-4/series) were provided with pancreatic fistulae and divided into three groups according to the type of diet which they were fed, which was for 18-27 days (11-18 days for controls); Group 1, fed a diet consisting of 2% fats, 20% proteins and 78% carbohydrates, and whose matched controls were fed a diet consisting of 29% fats, 20% proteins and 51% carbohydrates; Group 2, fed a diet consisting of 60% fats, 20% proteins and 20% carbohydrates, and whose matched controls were fed a diet of 30% fats, 20% proteins and 50% carbohydrates; and Group 3, fed a diet consisting of 9.6% fats, 8.4% proteins and 81% carbohydrates, and whose matched controls were fed a diet consisting of 33% fats, 22% proteins and 45% carbohydrates. It was found that secretion of enzymes by the pancreas is related to the nature of animal nutrition. The greatest increase in pancreatic secretion was found in animals of Group 3 (av. for controls was 4.5 ml/hr. and for experimental animals, 27.5 ml/hr.). Amylase secretion was increased in experimental animals of Group 1; proteinase at first decreased, then reached initial values or exceeded the latter, and lipase secretion was increased. With experimental animals of Group 2, amylase conc. was decreased, lipase was increased to a variable degree and proteinase initially decreased and then increased. These shifts in enzyme secretion were considerably dependent upon the type of components in the diet, such as fats. For experimental animals of Group 3, amylase and proteinase secretion were decreased, while lipase secretion was increased, although its conc. in pancreatic juice was somewhat decreased. The lipase:amylase was increased in animals in Groups 2 and 3, and the lipase:proteinase ratio was increased in Group 3 animals.

7850 A STUDY OF THE SECRETORY ACTIVITY IN MITOTIC ACINAR CELLS OF THE PANCREAS.

(Rus.) Kazaniev, V. V. (Inst. Human Morphol., Moscow). Biull. Eksp. Biol. Med. 62(11):94-96, 1966.

The relationship between cellular division and function was studied in pancreatic acinar cells of albino mice. Male mice (5-6 g wt.) of Group 1 were fasted for 10-12 hr., and those of Group 2 received food 1 hr. before sacrifice, which occurred during the period of max. mitotic activity. During mitosis, cellular functional activity was not completely inhibited. The capacity of cells to form and secrete granules was also preserved during mitosis. Several other processes concerned with secretion during mitosis were weakened or even completely inhibited. A decrease in the number of prozymogenic granules in the basal portion of the mitotic cell indirectly revealed a decrease in the formation of secretory substance during mitosis. Thus, the hypothesis of antagonism between the work and division of the cell only unilaterally reflects the complicated relationship of these processes. Only some of the special functions are depressed during mitosis. The content of amino acids (tyrosine, tryptophan, histidine) in zymogenic granules was approx. the same in dividing and interphase cells. The intensity of excretion was independent of the phase of mitosis.

7851 SECRETION OF CALCIUM BY THE CANINE PANCREAS. (E.) Zimmerman, M. J. (Mt. Sinai Hosp., New York, N. Y.), D. A. Dreiling, I. R. Rosenberg and H. D. Janowitz. Gastroenterology 52(5):865-874, 1967.

In 19 experiments on fasting dogs with permanent Thomas duodenal cannulas, secretion was stimulated by a single i.v. inj. of secretin (5 U/kg); in 10 other experiments, pancreozymin (2 U/kg) was added to the same dose of secretin. In 3, the effect of constant infusion of varying doses of secretin was also studied. Basal pancreatic juice total Ca ranged from 3.3-4.4 mEq/liter, with corresponding serum Ca from 4.0-5.5 mEq/liter. Ca conc. varied inversely with rate of flow and bicarbonate conc. At peak flow rates, Ca conc. fell to extremely low levels but returned to resting levels within 30-40 min. An initial rise in Ca output paralled the "washout" of enzyme. When pancreozymin was added to secretin, Ca output was augmented beyond that which could be ascribed to the known contamination of pancreozymin by secretin. These results indicate that total Ca is not correlated with the major electrolyte (bicarbonate)-containing fluid, and may be related to the enzyme-containing fraction.

7852 ENHANCEMENT OF PANCREATIC ENZYME SYNTHESIS BY PANCREOZYMIN. (E.) Rothman, S. S. (Harvard Med. Sch., Boston, Mass.) and H. Wells. Amer. J. Physiol. 213(1):215-218, 1967.

Pancreozymin (20 U/kg), secretin (20 U/kg) or methacholine (5 mg/kg) were inj. s.c. 3 times/day for 4 days into Holtzman rats (both sexes); the rats were fasted and sacrificed 16 hr. after the last inj. Pancreozymin, but not secretin or methacholine, caused a significant increase in pancreatic wt. which was attributable to hypertrophy of pancreatic acinar cells. In the enlarged pancreas, tissue conc. of trypsinogen, chymotrpsinogen and amylase were significantly increased. The change in enzyme conc. was "nonparallel", since the increase in chymotrypsinogen and amylase was more marked than that of trypsinogen. These results indicate that pancr zymin enhances the synthesis of these 3 exporta pancreatic enzymes.

7853 CALCIUM CONTENT OF DUODENAL JUICE. (Hansky, J. (Monash U., Melbourne, Australia). Amer. J. Dig. Dis. 12(7):725-733, 1967.

Duodenal intubation and stimulation with secret (1 U/kg and 3 U/kg) were performed on 20 normal subjects and 18 patients with chronic pancreati 4 with cancer of the pancreas, 4 with alcoholic cirrhosis and 2 with hyperparathyroidism. Amyl bicarbonate and Ca content of the duodenal flui was determined. Basal fasting Ca conc. in norm subjects was 3.0 mg/100 ml; after inj. of 1 U/k of secretin the conc. was 2.3 mg/100 ml. Large doses of secretin produced a fall in Ca conc. t a low of 1.8 mg/100 ml with 3 U/kg of secretin, but the rate of secretion of Ca was independent of the secretin dose. Subjects with chronic pancreatitis and alcoholic cirrhosis had increa basal and postsecretin conc. of Ca in duodenal fluid, but the output of Ca was more variable. Two patients with hyperparathyroidism gave evidence of normal pancreatic function in respo to standard secretin tests, but showed increase Ca conc. in basal fasting juice. The implicati of these results are discussed in terms of pancreatic calcification and the association between pancreatitis and hyperparathyroidism.

7854 GASTRIC SECRETION AND ITS FUNCTIONAL EXPLORATION. (Fr.)(Rev.) Ligny, G. (Civil Hosp., Charleroi, Hainaut, Belgium), S. Berge and R. Meunier. Agressologie 8(3):207 228, 1967.

7855 SPONTANEOUS RECOVERY OF GASTRIC SECRETION. (E.) Weir, D. G. (Trinity Col Dublin). Brit. Med. J. 2(5553):681, 1967.

7856 A SINGLE UNIT pH GLASS ULTRAMICRO ELECTRODE. (E.) Khuri, R. N. (Amer. U. Beirut, Lebanon), S. K. Agulian, H. Oelert a R. I. Harik. Pflueger. Arch. Ges. Physiol. 294(4):291-294, 1967.

7857 AMYLOLYTIC ENZYMES IN DOG SERUM. (E.) Franzini, C. (S. Antonio Abate Civil Hosp., Gallarate, Italy) and P. A. Bonini. Experientia 23(5):373-374, 1967.

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TID FLUID. (E.) Shannon, I. L. (Brooks
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Aerospace Med. SAM-TR-67-31, Pp. 1-4, 1967.

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RAPID TRANSFER OF CORTISOL FROM THE
BLOODSTREAM TO PAROTID FLUID. (E.) Shannon, I. L. Brooks AFB, Tex.). U.S. Air Force Sch. Aerospace Med. SAM-Tr-67-35, Pp. 1-6, 1967.

7865 THE SALIVARY AND THYROID GLANDS. A COMPARATIVE STUDY IN MAN. (E.) Mason, D. K. (U. Glasgow, Scotland), R. McG. Harden and W. D. Alexander. Brit. Dent. J. 122(11):485-489, 1967.

7866 A TECHNIC FOR SIALOGRAPHY. (E.) Damascelli, B. (U. Milan, Italy). Brit. J. Radiol. 40(475):554-555, 1967.

7867 PEROXIDASE ACTIVITY OF SALIVA. III. ACTIVITIES OF SALIVA FROM DIFFERENT SALIVARY GLANDS. (Jap.) Nagatsu, T. (Aichi-Gakuin U., Nagoya, Japan), H. Ohya, K. Kato and H. Kuzuya. Igaku to Seibutsugaku (Med. Biol. (Tokyo)) 74(4):192-194, 1967.

7868 BIOCHEMISTRY OF GASTRIC SECRETION. (Ger.)(Rev.) Heinz, E. Gastroenterologia (Basel) 107(1):7-14, 1967.

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7870 ACTION OF OXYTOCIN ON GASTRIC SECRETION PROVOKED BY THE LAMBLING METHOD. (Rum.) Groza, P. (Inst. Norm. and Path. Physiol., Bucharest), A. Oană, L. Rusovici and E. Ghizarie. Stud. Cercet. Fiziol. 12(2):79-83, 1967.

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7871 DISTRIBUTION OF THE ACTIVITY OF VARIOUS HYDROLASES, TRANSAMINASES, AND GLUTAMIC DEHYDROGENASE IN THE DIGESTIVE TRACTS OF FED AND FASTED RATS. (E.) Hsu, L. (U. California Sch. Med., San Francisco) and H. Tarver. Gastroenterology 53(1):78-87 1967.

Long-Evans and Sprague-Dawley rats were divided into fasted and nonfasted groups, and the distribution of various enzymes in their stomach, small intestine, cecum and colon was assessed. Cathepsins D and C were present in tissue homogenates prepared from all segments of the digestive tract of the rat. Some catheptic activity (as cathepsin D) was also found in the lumen of the stomach, but in the intestinal lumen such activity was small compared to that of trypsin and chymotrypsin. Glutamate dehydrogenase, aspartate aminotransferase, alanine aminotransferase and leucine aminopeptidase also were active in homogenates from all the segments of the tract, as well as in the luminal contents whether the rats were fed or fasted. Aryl sulfatase, β-glucuronidase and alkaline phosphatase activities were also present in both tissues and luminal contents. The proteases were present in the digestive tract of both fasted and fed rats, although in the fasting state there was an overall decrease in the proteolytic activity as well as in the conc. of protein and the products of its digestion. These findings indicate that the desquamated epithelial cells of the digestive tract mucosa contribute nonhydrolytic as well as hydrolytic enzymes to the lumen. Differential centrifugation of rat intestinal mucosa in sucrose indicated that the 2 cathepsins may be associated with lysozome-like particles. The activity of aspartate aminotransferase was found to sediment with that of glutamate dehydrogenase, whereas the intracellular distribution of alanine aminotransferase and alkaline phosphatase appeared to be less well-defined. Most of the leucine aminopeptidase activity was recovered in the cell supernatant fluid. The possible physiological significance of the enzymes acting on α-amino N in the lumen of the digestive tract is discussed. The gastrointestinal tract is also considered as a possible site for the breakdown of the plasma proteins, both intracellularly and extracellularly.

7872 THE CHEMISTRY AND PHYSIOLOGY OF SPECIFIC TRYPSIN INHIBITORS FROM THE PANCREAS OF CATTLE, DOG, HOG, AND MAN. (Ger.) Fritz, H. (U. Munich, Germany), I. Hüller, M. Wiedemann and E. Werle. Hoppe Seyler. Z. Physiol. Chem. 348(4):405-418, 1967.

Trypsinogen, trypsin, and trypsin inhibitor levels were assayed in the dog before and after i.m. inj. of 2.5 mg carbamylcholine; the secretions had parallel conc. of enzyme precursors and enzyme inhibitors. The specific inhibitors were then extracted from the pancreas of the hog, dog, cattle (ox) and man, and separated from trypsin by the formation of an insoluble trypsin-resin complex; the relatively low molecular wt. of t inhibitors made their separation easy; they we conc. by absorption on Sephadex columns. Each trypsin inhibitor, isolated from a different animal species, was further resolved by high voltage electrophoresis into 3 fractions, sti inhibitory, having the same amino acid composi as the specific inhibitor of the animal from which they were taken. Molecular wt. of the inhibitors (not the fractions), calculated fro the amino acid composition, were for dog 5636 (53 amino acids); hog 5695 (53 amino acids); cattle 5919 (54 amino acids) not including the amide groups. Each inhibitor from these 3 spe contained 2 tyrosine residues, but not tryptop histidine or phenylalanine. The 4 species-specific inhibitors did not inhibit α-chymotry kallikrein, plasmin, thrombin, or papain. The equilibrium between trypsin and the specific inhibitor was established very rapidly, after which the inhibition remained constant in the range 5.5-11. Human and hog trypsin inhibitor inhibited the enzyme stoichiometrically up to 100%; but a 50-60% excess of trypsin inhibitor of dog or cattle was required for complete inhibition. Bovine trypsin inhibitor acted no competitively, but the inhibitors of the other species behaved competitively toward trypsin i the presence of N-benzoyl-DL-arginine-p-nitroanilide. The 4 inhibitors showed the property of temporary inhibition against their own degr tion; when an inhibitor was present in an exce of trypsin at a pH of 7.8 and a temperature of 37° C, the inhibitor was degraded only very slowly; however, when the inhibitor was bound trypsin it was quickly degraded by free trypsi in the preparation. The parallel secretion of trypsinogen and trypsin inhibitor suggests the possibility that both may be stored in the sam zymogen granules to inhibit prematurely-activa trypsin in the glands or in the ducts.

7873 FILLING OF THE GALLBLADDER DURING DIGESTION. (ROENTGENOLOGIC INVESTIG TION). (Rus.) Antonova, G. M. (I. P. Pavlov Inst. Physiol., Leningrad, USSR). Fiziol. Zh. SSSR Sechenov 53(1):102-105, 1967.

This study was made on 7 randomly-bred dogs (3-7 yr. old; 11-18 kg body wt.) with or witho a gallbladder fistula; food stimulants include raw egg yolk (50 g), milk (600 g) and meat (10 g); cholecystography was made 5-180 min. after the admin. of biligraphin (0.2 ml/kg) which was used as contrast material. After a brief late period which followed feeding, motor activity of the gallbladder was increased and the secre of bile began. Entry of hepatic bile into the gallbladder was independent of the type of foo and it persisted during the entire process of digestion due to periodic changes of the sphinc tonus of the gallbladder duct and the terminal portion of the common bile duct. At the time c active gallbladder contraction, there were peri

cretion of bile into the intestine, which
delayed during stimulation of tonus in the
ncter of Oddi. In the latter case the move-
of bile was toward the gallbladder. The
w of contrast bile in the gallbladder was
intensive and smaller in the fed animals.
degree of gallbladder contraction was food-
ndent. Gallbladder bile entered the intestine
ox. every 30-40 min. after stimulation with
. Contrast bile filled the gallbladder 10-
in. after cholecystography following milk
ing; secretion of bile into the intestine
rred in the subsequent 15-20 min., and the
duration of bile secretion into the intestine
approx. 20 min. In various dogs after the feed-
of egg yolk, the periods of bile entering the
bladder, and its secretion into the intestine,
of similar duration; bladder filling usually
ed 19-25 min. and was followed by 15-20 min.
o filling. During the feeding of meat, milk
egg yolk to dogs with gallbladder fistulae,
entrance of liver bile into the gallbladder
rred during those brief and rare periods of
eased tonus of the gallbladder cervix. In
rast to healthy dogs, in operated dogs the
etion of contrast liver bile into the intestine
ample both in the presence and absence of
stion. Active gallbladder motility occurred
at the gallbladder cervix and the adjoining
s, while portions closer to the fistula re-
ed inactive. In open gallbladder fistulae,
did not completely evacuate the gallbladder
accumulated to a considerable amount in the
st regions of the gallbladder.

INFLUENCE EXERTED BY NITRITES AND
NITRATES UPON SOME DIGESTIVE ENZYMES.
.) Popov, V. I. (Cent. Inst. Postgrad. Med.,
ow). Vop. Pitan. 25(6):29-33, 1966.

effect of single or repeated doses (admin.
) of nitrites (NO_2, 2.7 mg/kg; as the K salt,
/kg) or nitrates (NO_3, 40.8 mg/kg; as the K
, 66.5 mg/kg), or a combination of both, on
activity of digestive enzymes was studied in
albino rats (210-250 g). A single admin.
O_2 had no effect. NO_2 and NO_3 one time
eased the activity of alkaline phosphatase
pprox. 54%, and that of enterokinase by approx.
while the activity of lipase was increased
pprox. 28%. The repeated admin. of NO_2
lted in a decrease of alkaline phosphatase
the tenth day of treatment, but it reached
same values as controls by the twentieth and
rtieth day of the experiment; enterokinase and
se activity was decreased by the tenth day
it reached control values by day 20 and again
reased by the thirtieth day. Under NO_2 and
treatment, the activity of lipase and alkaline
sphatase remained at control levels up to the
th day of the experiment, but by the twentieth
they were markedly decreased and remained so
to the thirtieth day of the experiment; the
ivity of enterokinase showed a decrease only
the thirtieth day of the experiment. There
a cumulative inhibitory effect upon pancreatic lipase and alkaline phosphatase when NO_2 and NO_3 were admin. simultaneously. Thus, NO_2 and NO_3 had an unfavorable effect upon the organism, and it would seem expedient to limit their use in food.

7875 THE IMPORTANCE OF GLUCOSIDIC ENZYMES DURING THE SPLITTING OF MALT-OLIGO-SACCHARIDES AND STARCH. (Ger.) Ruttloff, H. (Inst. Nutr., Potsdam-Rehbrucke, Germany), R. Friese and K. Täufel. Hoppe Seyler. Z. Physiol. Chem. 348(6):705-710, 1967.

Comparative studies on the glucosidic enzymes, homogenates of the mucosa and intestinal juices of the rat and pig, and α-amylase from the pancreas were undertaken using malt-oligosaccharides (maltose, maltatriose, maltatetrose, and maltapentose) and starch as substrates. α-Amylase was purified from the pancreas of rat and pig by standard methods; the glucoamylases were obtained by freeing them from homogenates by use of trypsin, centrifuging, and then conc. and isolating the enzymes by column chromatography. Enzyme activities were determined by measurement of liberated glucose. In order to obtain glucosidases free of α-amylase the preparations in soln. were heated to 50° C for 15 min., completely inactivating the α-amylase. α-Amylase produced glucose from the tri-, tetra-, and pentasaccharides but its glucosidic activity was too low to be significant; this was especially true in extracts of the mucosa. Taking the α-amylase activity (internal splitting of substrate molecule) of each source as equal to 100, the glucoamylases were equal to 3 in rat mucosa, 2.5 in pig mucosa and 0.5 in intestinal juices of rat and pig. In the intestinal lumen, maltatriose was hydrolyzed exclusively by glucosidic enzymes (chiefly glucoamylase). The tetra- and pentasaccharides were hydrolyzed both from the center (α-amylolytic) and terminally (glucosidic). The glucosidic activity was mainly of the glucoamylase type. The glucosidase activities measured in the intestinal juice consisted of about equal proportions of α-amylase and glucoamylase.

7876 π-, δ-, AND γ-CHYMOTRYPSIN: THREE-DIMENSIONAL ELECTRON-DENSITY AND DIFFERENCE MAPS AT 5 Å RESOLUTION, AND COMPARISON WITH CHYMOTRYPSINOGEN. (E.) Kraut, J. (U. California, San Diego), H. T. Wright, M. Kellerman and S. T. Freer. Proc. Nat. Acad. Sci. U.S.A. 58(1):304-311, 1967.

7877 THE SEQUENCE AROUND THE ACTIVE-CENTER TYROSYL RESIDUE OF BOVINE PANCREATIC CARBOXYPEPTIDASE A. (E.) Roholt, D. A. (Roswell Park Mem. Inst., Buffalo, N. Y.) and D. Pressman. Proc. Nat. Acad. Sci. U.S.A. 58(1):280-285, 1967.

7878 THE EFFECT OF LECITHIN ON THE ACTIVITY OF PANCREATIC LIPASE. (E.) Klein, E.

(Roswell Park Mem. Inst., Buffalo, N. Y.), R. B. Lyman, Jr., L. Peterson and R. I. Berger. Life Sci. 6(12):1305-1307, 1967.

7879 BODY WEIGHT CHANGES, PANCREAS SIZE AND ENZYME ACTIVITY, AND PROTEOLYTIC ENZYME ACTIVITY AND PROTEIN DIGESTION IN INTESTINAL CONTENTS FROM CALVES FED SOYBEAN AND MILK PROTEIN DIETS. (E.) Gorrill, A. D. L. (Michigan State U., East Lansing) and J. W. Thomas. J. Nutr. 92(2):215-223, 1967.

7880 AMINO ACID SEQUENCE AROUND THE HISTI RESIDUE OF THE α-LYTIC PROTEASE OF SORANGIUM SPECIES, A BACTERIAL HOMOLOG OF THE PANCREATIC SERINE PROTEASES. (E.) Smillie, (U. Alberta, Edmonton, Canada) and D. R. Whita J. Amer. Chem. Soc. 89(13):3350-3352, 1967.

See also abstract nos.: 7748,8331

AN EXCITATORY ADRENERGIC ALPHA RECEPTOR
MECHANISM OF TERMINAL GUINEA-PIG ILEUM.
Reynolds, D. G. (Walter Reed Army Med.
, Washington, D. C.), G. E. Demaree and M. H.
fer. Proc. Soc. Exp. Biol. Med. 125(1):
3, 1967.

terminal ileum was removed from each of 10
ea pigs, and bathed in a balanced, buffered
rolyte soln. of the following composition:
laCl, 0.2 g KCl, 0.15 g $CaCl_2$, 0.05 g
O_4, 0.2 g $MgCl_2$ $6H_2O$, 1 g $NaHCO_3$ and 1 g
ose per liter. The following drugs were
as adrenergic test agents in differential
tor blockade sequences in order to
idate the adrenergic mechanism involved:
lephrine, epinephrine, norepinephrine and
renaline. The action of these agents was
ed on the tissue during its stimulation by
lcholine. Phenoxybenzamine was used as an
nd propranolol as a β-adrenergic receptor-
blocking agent. Alpha-receptor blockade
lted from a 30-min. exposure to 2.5 x 10^{-9}
oxybenzamine, while propranolol (4 x 10^{-6})
30 min. produced an effective, but not
lete, β block. Other drugs used included
amine, diphenhydramine, serotonin, reserpine,
pine and morphine. Phenylephrine caused a
raction of ileum which resembled a pure
ceptor site response. Both epinephrine and
inephrine produced biphasic responses which
owed a pattern of α excitation followed by β
bition, while isoprenaline elicited a pure β
bitory action. Use of phenoxybenzamine as an
ocking agent abolished all excitatory
onses while augmenting β- actions.
ranolol, through β-adrenergic receptor site
kade, potentiated α-excitatory actions. It
uggested, on the basis of these studies, that
terminal guinea-pig ileum possessed an
ue α-adrenergic receptor mechanism which is
tatory in nature.

ADDITIONAL EVIDENCE FOR THE PARTICIPATION
OF 5-HYDROXYTRYPTAMINE IN THE INTESTINAL
ONSE TO MORPHINE. (E.) Burks, T. F. (U.
Coll. Med., Iowa City) and J. P. Long.
. Soc. Exp. Biol. Med. 125(1):227-230, 1967.

tal of 2470 young adult male Swiss Webster
e mice were randomly divided into groups of
nimals each. Powdered charcoal was suspended
lycerine and admin. p.o. to the animals in
of 1 ml, and the animals were sacrificed 20
after receiving the charcoal meal. Morphine
doses of 1.2-5.0 mg/kg), physostigmine
mg/kg), serotonin (10 mg/kg) and saline
admin. to the animals 10 min. before
coal; methysergide (10 mg/kg) and atropine
mg/kg) were given 30 min. before charcoal;
reserpine (5.0 mg/kg) was given 16 hr. before
coal. The effects of these agents on
rointestinal propulsion of the charcoal meal
assayed. Morphine and 5-hydroxytryptamine inhibited intestinal propulsive activity. Delay of passage of a charcoal meal through the mouse small intestine by morphine was antagonized by methysergide, a potent inhibitor of 5-hydroxytryptamine. Treatment with reserpine failed to modify the intestinal response to morphine. The effects of atropine on morphine and 5-hydroxytryptamine were similar; treatment with atropine enhanced the delay in intestinal transit produced by these agents. Treatment with physostigmine failed to alter the intestinal effects of either serotonin or morphine. These results were interpreted as supporting the hypothesis that some of the actions of morphine on the mammalian small intestine may be mediated by serotonin.

7883 PLASMA VILLIKININ. (E.) Johnston, C. L., Jr. (Med. Coll. Virginia, Richmond), E. Kokas and E. S. Barrow. Proc. Soc. Exp. Biol. Med. 125(1):281-284, 1967.

Outdated human plasma was processed in 200 ml batches, and crude extracts were harvested by processes used to obtain intestinal mucosal and urine extracts of villikinin. Each sample was tested for its effect upon villous motility. It was found that plasma contained a material capable of markedly increasing villous motility. It was not possible to distinguish a difference between the activities of crude mucosal, plasma and urine preparations of villikinin, although it is suggested that there may be conc. differences. Refined preparations of villikinin showed a similarity to mucosal and urine extracts in activity as well as mobility, but it was not possible to demonstrate antivillikinin in preparations other than those from intestinal mucosa. Extracts from bovine and canine plasma gave identical results to those obtained with extracts from human plasma. The activity of villikinin was different from that produced by histamine, serotonin and bradykinin. It is concluded that these results clearly demonstrate the presence of villikinin in the plasma, and that plasma villikinin is similar to mucosal and urovillikinin.

7884 FUNDAMENTAL RESEARCH FOR THE PHARMACOLOGICAL ACTIVITY OF ORIENTAL DRUGS. IV. ON THE SYNERGISM FOR THE ACTION OF CHOLEKINESIS BETWEEN COMPONENTS CONTAINED WITHIN THE CRUDE DRUG "BEZOAR ORIENTALE". (STUDIES ON THE FUNCTION OF SMOOTH MUSCLES. II.). (Jap.) Kimura, M. (U. Toyama, Japan), E. Osada, S. Kagami and D. Shiho. Yakugaku Zasshi (J. Pharm. Soc. Jap.) 87(5):550-553, 1967.

The cholagogic action of the crude drug, oriental bezoar, was examined by dividing its action into contraction of the gallbladder and relaxation of the sphincter of Oddi in the pig. It was found that, among the components of bezoar, the substance which causes contraction of the smooth muscle (a peptide-like substance) was the only one which caused contraction of the gallbladder and of the sphincter of Oddi; most of the other bile acid salts had a relaxing effect. Deoxycholate had the strongest relaxing action on the sphincter of Oddi and this was found to be the principle which caused cholagogic action by the bezoar. The smooth muscle-contracting substance inhibited the relaxing action of deoxycholate in the gallbladder. It is concluded that pharmacologically antagonistic substances, acting on the same point, formed a functionally co-operating system which effected cholagogic activity.

7885 THE SERIES ELASTICITY OF ACTIVE TAENIA COLI IN VITRO. (E.) Åberg, A. K. G. (U. Goteborg, Sweden). Acta Physiol. Scand. 69(4):348-354, 1967.

The series elastic components of smooth muscle taenia coli of the guinea pig were studied. The rate of isotonic shortening after release of an isometrically contracting taenia coli showed that the muscle behaved like a model with contractile elements in series with elastic components. Thus, taenia coli has series elastic components in the same sense as it has been described for striated muscles and heart muscles. At 37°C and full isometric tension, the series elastic components in taenia coli in vitro were measured to be extended, on the av., 13.1±2.7% of L_0 (the greatest length of an inactive muscle when the force applied to straighten it did not exceed 50 dynes). Max. "isometric" work developed during an isometric contraction was approx. 30% of the max. work that the muscle could perform during an isotonic shortening.

7886 PARADOXICAL INTESTINAL INHIBITORY EFFECTS OF STAPHYLOCOCCAL ENTEROTOXIN. (E.) Shemano, I. (Nat. Drug. Co., Philadelphia, Pa.), J. T. Hitchens and J. M. Beiler. Gastroenterology 53(1):71-77, 1967.

Highly purified staphylococcal enterotoxin (100 μg/kg, admin. i.v.; obtained from a strain S-6(Staphylococcus aureus) induced emesis, diarrhea and a marked depression of intestinal tone and contractility in conscious trained dogs with Thiry-Vella loops, Mann loops or cecostomies. The enterotoxin markedly inhibited intestinal transport in dogs, as shown by charcoal meal, sponge bolus studies, and X-ray studies using a Ba meal. Gastric emptying time was also markedly delayed. In contrast to these findings in conscious dogs, no intestinal inhibition was seen in dogs anesthetized with pentobarbital. Neither chronic bilateral vagotomy nor chemical sympathectomy (guanethidine and N,N-diisopropyl-N'-isoamyl-N'-diethylaminoethylurea) markedly influenced the intestinal depressant effects of enterotoxin. Enterotoxin exerted no effects on spontaneous contractility or tone of isolated rabbit ileum in bath conc. up to 10 μg/ml, nor did it influence the spasmogenic effects of acetylcholine or $BaCl_2$. These findings indicate that enterotoxin-induced diarrhea in these experiments cannot be explained by increased intestinal motility and transport. It is possible that the observed diarrhea is attributable in part to alterations in fluid flux into and out of the intestinal lumen. The mechanism of the intestinal depressant effec of enterotoxin must still be elucidated; it does not seem to be related to a direct action on intestine, an atropine or papaverine-like effect central vagal inhibition, a peripheral release of catecholamines, or enterotoxin-induced nausea and vomiting.

7887 RELEASE OF INTESTINAL 5-HYDROXYTRYPTAMI BY MORPHINE AND RELATED AGENTS. (E.) Burks, T. F. (U. Iowa, Iowa City) and J. P. Long J. Pharmacol. Exp. Ther. 156(2):267-276, 1967.

The release of serotonin into the perfused vasculature of isolated dog intestinal segments occurred after intra-arterial admin. of morphine meperidine, methadone, levorphanol, nalorphine, apomorphine or codeine. The duration of seroton release corresponded approx. with the increased intestinal tone which was produced. Codeine and morphine were less potent spasmogens of the dog intestine during periods of serotonin tachyphylaxis than during control periods. Perfusion of the isolated dog intestinal segment with Ca ion-deficient soln. reversibly decreased intestinal responses to acetylcholine, nicotine, serotonin, levorphanol, codeine and morphine. K-deficiency had no significant effects. The in situ intestinal responses to morphine were decreased in reserpine-pretreated dogs. It is suggested that serotonin participates in responses of the dog intestine to morphine and related agents.

7888 INHIBITION OF INTESTINAL MOTILITY IN MAN BY GLUCAGON GIVEN INTRAPORTALLY. (E.) Kock, N. G. (U. Goteborg, Sweden), N. Darle and G. Dotevall. Gastroenterology 53(1): 88-92, 1967.

The effect on intestinal motility of intraportal inj. of glucagon was studied in 7 patients (5 of whom had cholecystectomy due to gallbladder stones, 1 had intestinal resection due to stenosing regional enteritis and 1 had a transverse colostomy due to an inoperable sigmoid cancer). Glucagon was inj. by plastic tube that had been introduced into an omental vein at operation 5-7 days previously; that glucagon actually reached the portal vein was verified by inj. radiopaque medium and also by counting radio-activity over the liver after inj. of radioactive Xenon into the omental vein. The effect of glucagon on intestinal motility was recorded by a balloon method. Intraportal inj. of 0.05-0.1 mg glucago inhibited motility in both the jejunum and colon the inhibitory effect appeared within 30-60 sec. after inj. After intraportal inj. of 0.1 mg glucagon, the inhibitory effect lasted approx. 8 min., and after inj. of 0.05 mg the effect

ed 4-5 min. Inj. of glucagon into a brachial
in the same doses produced similar intes-
l inhibition in patients studied before and
r operation. The latency was 30-60 sec., and
duration of inhibition was as long as when
drug was given intraportally. Placebo inj.
ml of 0.9% NaCl soln. into the omemntal vein
nto the brachial vein did not induce any
bition. The effect of i.v. inj. of glucagon
the same in subjects who had not undergone
ery. Since glucagon inhibited intestinal
lity similarly after both routes of admin.,
inhibitory effect of glucagon was not
ted on passing through the liver. Since the
shold dose of glucagon was identical for
routes of admin., either all of the inj.
agon passed the liver unchanged, inducing
stinal inhibition on reaching the intestine
he systemic circulation, or the glucagon was
erted by the liver to some other substance
h still had the same pharmacological effect
ntestinal smooth muscle as glucagon.
rnatively, the glucagon in the liver may have
rated some substance with the same inhibitory
erties as glucagon.

ACTIONS OF CALCIUM AND CERTAIN MULTI-
VALENT CATIONS ON POTASSIUM CONTRACTURE
UINEA-PIG'S TAENIA COLI. (E.) Imai, S.
yo Med. and Dent. U., Bunkyo-ku, Tokyo) and
akeda. *J. Physiol. (London)* 190(1):155-169,
.

uffers and multivalent cations were used to
rmine the effect of severe Ca deficit on
K contracture (spike phase) of guinea pig
ia coli, and to determine the source of the
Lack of Ca led to the extinction of the
ial phasic response (which was preferentially
cted) of the pig's taenia coli at conc.
w 10^{-7} M. At conc. of 10^{-8} M the tonic
onse persisted, although diminished. Various
ivalent cations augmented the remaining tonic
onse but did not restore the phasic response
a-free media. These cations, when K
ractures were induced in normal Ca media,
ished the phasic response and partially
essed the tonic phase, and inhibited some of
fully developed contracture. It was concluded
the phasic response and some of the tonic
onse depend upon extracellular Ca for
iating them, and for maintaining tension in
of the tonic response. Bound Ca is involved
he remainder of the tonic response, and is
ased by sustained membrane depolarization.

THE "GLASS BALL TEST", A METHOD FOR
TESTING THE EFFECT OF DRUGS ON THE
NIC PERISTALSIS OF THE RAT. (Ger.) Schottek,
Martin Luther U., Halle-Wittenberg, Germany).
eimittelforschung 17(5):649-650, 1967.

effect of drugs upon the peristalsis of the
e intestine can be assayed in the rat *in vivo*
ugh the glass ball test. The rate of transportation of a glass ball 6 mm in diameter through 6 cm of large intestine is measured in the nonoperated, nonnarcotized animal. The glass ball is inserted into the ampulla recti and then carefully pushed into the large intestine by means of a glass rod which is easily done with only slight pressure. Using rats (200 g) and inserting the glass ball for no more than 6 cm no difficulty is encountered. Under normal conditions in 88 trials, the time for the ball to travel 6 cm was 16± 5.4 min. or about 0.4 cm/min. The inhibition of large intestinal peristalsis to a passage time of 1 hr. or more is considered clear evidence of inhibition of the colon; this has been observed with morphine, methadone, codeine and pethidine. The test can be equally well applied to the evaluation of drugs which stimulate peristalsis, when the time of passage may be only 3-4 min. The guinea pig offered a passive resistance to the insertion of a glass ball into the ampulla recti. The stretching of the lower large intestine also seemed unduly severe. However, the test does work in mice where the diameter of the glass ball should be 3 mm and the total distance of insertion should be 2 cm. The time of passage is about 6 min. or about 0.3 cm/min.

7891 INTESTINAL MOTILITY IN MAN: THE EFFECT OF BRADYKININ ON THE MOTILITY OF THE DISTAL COLON. (E.) Murrell, T. G. C. (U. Adelaide, S. Australia) and D. J. Deller. *Amer. J. Dig. Dis.* 12(6):568-576, 1967.

The effect of bradykinin on intestinal motility was studied in 43 subjects (25 men, 18 women); the motility indices of 14 with normal intestinal function were compared with those of 14 patients with diarrhea and 15 with constipation; of the 29 with disturbed intestinal function, 14 had the irritable-colon syndrome. Patients with active diarrhea due to gluten-sensitive enteropathy (4), ulcerative colitis (3), and pancreatic and postgastrectomy steatorrhea (4), and patients with constipation due to carcinoma of the rectum (2) and diverticulosis (2) were included. Three open-ended catheters of 1.5 mm diameter were inserted through a sigmoidoscope to approx. levels of 25, 18 and 11 cm from the anus, and the resting pattern of motility was first recorded for 30 min. After an i.v. inj. of isotonic saline, 0.1 mg of bradykinin in 20 ml of isotonic saline was admin. i.v. at a rate of 10 μg/min. for 3-5 min.; the rate was increased to 20 μg/min. for the remaining amount of 50 μg, if this dose could be tolerated by the subject. A full single dose of 100 μg was used in all but 7 of 43 subjects. The effect of a second infusion of bradykinin was examined in 3 subjects with the irritable-colon syndrome in whom motility had been augmented by 1 mg of prostigmine inj. i.m. 20 min. earlier. Bradykinin produced a decrease in motor activity in the distal colon in most controls as well as in patients with diarrhea and constipation; amplitude and duration of waves were equally reduced. However, response to bradykinin was not uniform and in controls a rise in motor activity to 200% or more was noted in 2 subjects. In all 43 subjects, bradykinin produced a decrease to 50% or less of the resting value of percentage activity in 27 subjects (62.8%), of whom 9 were controls, 9 had diarrhea and 9 had constipation. In 14 subjects (32.6%) there was no change in activity. In spite of variability of response, bradykinin generally produced a reduction in wave patterns which was most obvious in patients with diarrhea; of the 14 subjects in this group, bradykinin completely abolished motility in 6 and reduced the motility index below 50% of the resting level in another 3, while there was no change in 5. Variable response to bradykinin was also apparent in patients with the irritable-colon syndrome. The motor activity induced by prostigmine was abolished by bradykinin.

7892 ANAL SPHINCTER PRESSURE CHARACTERISTICS. (E.) Katz, L. A. (Yale U. Sch. Med., New Haven, Conn.), H. J. Kaufmann and H. M. Spiro. Gastroenterology 52(3):513-518, 1967.

A simple method for recording pressures in the anal sphincter during distention at rest and during voluntary contraction is presented. The resting sphincter resisted distention until a resting yield pressure was reached, after which further distention of the sphincter produced no further pressure rise. Max. sphincter pressure was reached by voluntary contraction only after the recording balloon had been distended to the vol. needed to reach the resting yield pressure. The ability of the sphincter to resist distention appeared to be the mechanism for maintaining continence at rest; however, contraction of the voluntary component of the anal sphincter can forcibly close the sphincter when distended and thereby maintain continence. Of 48 subjects studied, all 14 with incontinence were found to have normal resting yield pressures, but max. sphincter pressures varied depending upon the cause of incontinence. Most patients with incontinence had low max. sphincter pressure, but incontinence was not invariable with low max. sphincter pressure. It is possible to differentiate patients with incontinence as the result of abnormalities of the voluntary component of the anal sphincter from those patients with incontinence of other cause.

7893 IN VIVO CONTRACTILITY OF SMOOTH MUSCLE BY CHOLECYSTOKININ CONCENTRATES. (E.) Denton, R. W. (U. Illinois Coll. Med., Chicago) and L. L. Gershbein. Arch. Int. Pharmacodyn. 166(2):473-485, 1967.

A balloon and tambour apparatus was used for measuring the contractions of the stomach, gallbladder, small intestine and colon, in intact and vagotomized, anesthetized dogs prepared with gastrostomies, Pavlov and Heidenhain pouches, jejunostomies and cholecystostomies. Cholecystokinin concentrates (20-200 U) elicited contraction of the intact stomach, gallbladder, intestine and colon in dogs anesthetized mainly with pentobarbital. The data collected were essentially in agreement with those collected earlier in vitro in guinea pigs. The stomach of the anesthetized dog underwent relaxation or showed no response to cholecystokinin concentrates, however, the awake vagotomized dog showed stoma contractions similar to those of the anesthetiz dog. Both anesthetized and nonanesthetized dog showed contractility of the intact gallbladder and intestine following cholecystokinin concentrates. As was previously described in in vitr studies, pituitrin antagonized the response of the dog gallbladder induced by cholecystokinin concentrates.

7894 THE ROLE OF GASTRIN IN GASTROILEOCOLIC RESPONSES. (E.) Connell, A. M. (Roy. Victoria Hosp., Belfast, Northern Ireland) and C. J. H. Logan. Amer. J. Dig. Dis. 12(3): 277-284, 1967

Intraluminal pressures were recorded from the small intestine using a pressure-sensitive radiotelemetering capsule and from the large intestine using miniature balloons. Normal volunteers (18) were used for the studies. Two preparations were studied: pure Gastrin II prepared according to the method of Gregory and Tracy, and the gastrin-like pentapeptide, ICI 50,123. ICI 50,123 was also studied in 2 dogs prepared with Thiry fistulas. No consistent effect on the terminal ileum was found with Gastrin II (0.25 μg/kg/min. for 3 min.). ICI 5 given both i.v., 0.25-0.5 μg/kg, and s.c., 2-4 μg/kg produced only small effects on the termin ileum. Rectal motility was increased by both Gastrin II and ICI 50,123 by the i.v. route. Comparable data was not available for Gastrin I but ICI 50,123 increased motility of the sigmoi rectosigmoid, as well as the rectum. In the do studies, atropine 0.3-0.6 mg depressed or abolished gastrin-induced motility. It is concluded that since the doses studied were at essentially physiological levels it is reasonab to postulate that gastrin released by eating stimulates colonic motility in man. The effect on the intestine were not clear and additional study is needed.

7895 GASTROINTESTINAL ACTIONS OF METOCLOPRA AN EXPERIMENTAL STUDY. (E.) Jacoby, H. I. (Merck Inst. Ther. Res., West Point, Pa.) and D. A. Brodie. Gastroenterology 52(4): 676-684, 1967.

In rats, metoclopramide [N-(diethylaminoethyl)-2-methoxy-4-amino-5-chlorobenzamide], at 16 and 32, but not at 8 mg/kg s.c., produced a significant acceleration of gastric emptying. Metoclopramide (2 mg/kg i.m.) caused a significant reduction (always 50% or more) in emptying time in 3 monkeys. Metoclopramide (1,2, and 4 mg/kg

) stimulated gastric contractile activity in
sthetized and unanesthetized dogs. No
nificant increase in gastric acid secretion
ld be observed in either rats or dogs, despite
marked stimulation of gastric motor activity.
tric motor stimulation was antagonized by
icholinergics (atropine 0.01 mg/kg i.v.) and
phine (0.4 mg/kg i.v.) but was not blocked by
ateral cervical vagotomy or by a ganglionic-
cking drug (chlorisondamine 1 mg/kg i.v.) plus
otomy. The action of metoclopramide appears
involve activation of intramural cholinergic
rons responsible for modifying gastric
ility but not acid secretion, either by a
ect stimulation or by removal of inhibitory
luences. Direct evidence for either mode of
ion was not obtained.

5 RADIOLOGIC STUDY OF ENDOCRINE CONTROL OF
GASTROINTESTINAL MOTILITY IN THE ALBINO
. I. EFFECT OF AN ASSOCIATION OF 17-ALPHA-
INYL-17-HYDROXY-5(10)-ESTRENE-3-ONE AND
INYLESTRADIOL-3-METHYL ETHER. (It.) Livrea,
(U. Messina, Italy), G. Longo and C.
rgianni. Boll. Soc. Ital. Biol. Sper. 42(24):
3-2056, 1966.

idely-used contraceptive mixture consisting of
parts ethinylestradiol-3-methyl ether plus
5 parts 17-α-ethinyl-17-hydroxy-5(10)-estrene-
ne was admin. daily to 4 male and 4 female, 90
-old, WAG rats by gastric sound (1.5 mg/10g/dose,
pended in 0.5 ml physiologic saline).
er 10 days of treatment, the stomach appeared
be somewhat increased in vol. and the duodenum
ld not be visualized. The stomach required
hr. to empty, as contrasted to slightly more
n 1 hr. in the same animals, prior to treat-
t. At the same time, the motility of the
ll intestine was somewhat increased, as com-
ed to pretreatment studies, and the colon
tinued to empty normally. Substantially
ntical effects were in evidence after 15 days
treatment. It is concluded that the mixture
rted a selective effect on the smooth muscle
the stomach, reducing motility appreciably,
le stimulating the motility of the small
estine to a slight degree and exerting no
cernible effect on the colon.

7 EFFECTS OF TETRODOTOXIN ON INNERVATED
SMOOTH MUSCLE PREPARATIONS. (E.)
shon, M. D. (U. Oxford, England). Brit. J.
rmacol. 29(3):259-279, 1967.

en muscle preparations were obtained from
mals: guinea-pig stomach (with thoracic vagi
celiac axis), cannulated through pylorus;
se stomach (similar to above) cannulated through
denum; longitudinal muscle of 3-cm length of
bit ileum; lengths of nonterminal guinea-pig
um (either as entire intestine or only
gitudinal muscle); fundus of rat stomach; rat
denum; guinea-pig taenia coli. The first 4
e stimulated electrically, the last 3 used to test drug response. Tetrodotoxin abolished effects produced by nervous stimulation. They recovered after removal of this agent. It abolished action potentials in the vagus nerve. All of its effects could be explained by block of nervous activity. In its presence, no response to any drug, except acetylcholine, was modified by either eserine or hyoscine. It was concluded that, in its presence, responses to drugs must have been direct effects on smooth muscle and not due in part to the release of acetylcholine. Tetrodotoxin abolished responses to drugs (nicotine, dimethylphenylpiperazinium iodide, choline phenyl ether, serotonin) which act only through stimulation of nerves; reduced responses to drugs which act partly by direct excitatory action on the muscle; potentiated responses to drugs, such as acetylcholine, whose actions were antagonistic to the direct excitatory muscle action; had no effect on responses to drugs whose sole action was on the smooth muscle. When the antagonistic neural response was dominant, as with choline phenyl ether, the muscle response was masked with tetrodotoxin. Response of guinea-pig ileum to drugs in the presence of this agent were the same as those of denervated longitudinal smooth muscle strips. It is concluded that the action of tetrodotoxin is limited to nervous tissue in innervated smooth muscle preparations.

7898 A METHOD OF MEASURING THE RATE OF PERISTALTIC MOVEMENTS OF THE GUT. (E.) Lockett, C. J. (U. Cape Town, South Africa). Lab. Pract. 15(12):1394, 1966.

The last few inches were removed from a Ryle tube, and a small rounded plastic tip inserted to seal it. Six glass relays were inserted in the tube, wired in series with thin resistance wire (10 ohms between relays), connected to an external battery, calibrating circuit, and Servo type pen recorder. In humans and dogs the tube was passed through the nose down the trachea into the stomach and duodenum, monitored by X-ray, and then connected to control box and recorder. A plastic-enclosed magnet was swallowed with a glass of water. When the apparatus is on, as the magnet passes each section of the tube, the relay closes and produces a signal rise equal to the value of the resistance between relay and battery, recording peristaltic rate and movement. Signals are recorded in step formation on squared graph paper and each section of the tube is identifiable (from the corresponding relay). A recent modification with micro-circuitry permits complete assemblage outside of the tube. The whole prewired apparatus is then inserted into the Ryle tube and both ends are sealed.

7899 STUDIES ON THE NORMAL DEGLUTITION COMPLEX. (E.) Vantrappen, G. (St. Raphael U. Hosp., Louvain, Belgium) and J. Hellemans. Amer. J. Dig. Dis. 12(3):255-266, 1967.

The deglutition complex was studied in 25 normal subjects. Intraesophageal pressures were measured with a set of 3 water-filled, open-tip catheters tied together with their distal ends 5 cm apart. The catheters were passed by mouth into the stomach. A "pull-through" technic was followed with measurements of resting and deglutitive pressures at 2-cm intervals. The initial negative deflection was observed in one-third the swallowing complexes occurring equally in the upper, middle, and lower esophagus. The mean speed of progression av. 50 cm/sec. The second positive wave was observed in 31% of complexes in the lower third of the esophagus, 14% in the middle third and not at all in the upper third. The terminal positive wave was found in 86% of deglutitions recorded, 80% were peristaltic, 20% were simultaneous. The origin of the initial negative deflection was studied by simultaneous intraesophageal and intrapleural pressure measurements. It was found that respiratory motions attend swallowing. The initial deflection in the swallowing complex appeared related to the initial dip in intrapleural pressure, which was considered to suggest that "swallowing respiration" may be responsible for the first component of the complex. The frequency of the second positive wave was increased by inserting a large tube into the stomach through the gastroesophageal sphincter; shunting resistance of the tube (by perforations) above and below the sphincter dropped the frequency to normal levels. The second positive wave was associated with peristaltic terminal peaks. It is concluded this wave is a passive phenomenon resulting from compression of the closed esophageal compartment ahead of peristaltic contractions.

7900 NEW METHODS OF STUDYING INTESTINAL TRANSIT TIMES. (E.) Rosswick, R. P. (St. George's Hosp., London), R. D. Stedeford and B. N. Brooke. Gut 8(2):195-196, 1967.

A simple, accurate, safe and economical method is described for determining intestinal transit time, using an araldite capsule of approx. 1 cm diameter, which has ^{131}I sealed in it (i.e., it is a pure gamma emitter yielding an activity up to 10 μc), and also some tiny Pb pellets. The capsule can be manufactured in the physics department of the hospital. A portable NaI scintillation counter, brought to bedside, determines capsule location to within 1 cm after screening the NaI crystal with a Pb collimator head. A transparent plastic table is placed over the patient's abdomen, and the movement of the ingested capsule is plotted on a grid marked on the table. Readings at 10-min. intervals are plotted on graph paper. Radiographic confirmation was done for this study, but is not thought to be necessary once the counting technic is practiced. The patient is not very inconvenienced, and may eat, drink, and go to the lavatory during the examination. Twenty-five determinations were done on 24 patients with Crohn's disease and with ulcerative colitis, and with patients with no known gastrointestinal disorder. It wa found that emptying of the stomach in ulcerativ colitis may be delayed, thus suggesting use of this method of transit time in differentiating between Crohn's disease and ulcerative colitis.

7901 A SIMPLE INSTRUMENT FOR THE MEASUREMEN OF INTESTINAL MOTILITY WITH IMPLANTED INDUCTION COILS. (Ger.) Engelhardt, W. (Vet. Inst., Hanover, Germany), G. Tolkmitt, H. J. Ehrlein and L. H. Stahlgren. Pflueger Arch. Ge Physiol. 294(3):229-234, 1967.

Long-term measurements (over periods of days or wk.) of intestinal motility have been done with a combination of strain gauges and induction coils, although strain gauges quickly lose sensitivity. A system employing only induction coils gave uniform responses for periods in excess of 3 wk. Construction of the coils was as follows: The ferrite core was 2.1 mm in diameter wound with 200 turns of Cu wire 0.08 m in diameter; diameter of the finished coil without housing was 5.0 mm, 2.5 mm high; housing wa thin plastic; leads were in a silicone tube. Induction between an implanted coil (secondary) and an overlying primary coil supplied by a transistorized 15 kilohertz oscillator was a function of the distance between the coils, the strength of the magnetic fields, and the number of turns in the secondary winding. As the coil must be small for many purposes and the distanc between them 1-5 cm, induced voltage was small; the output from the secondary was fed into a 3-stage transistorized amplifier with an oscilloscope output as well as a recorder outpu Calibration was simplified by potentiometric control of the oscillator output voltage. A schematic diagram is furnished in the paper. With this apparatus a number of factors in intestinal mobility have been investigated in 1 dogs for periods up to 3 wk.

7902 CONTRACTILE AND ELECTRIC ACTIVITY OF THE EXTRAHEPATIC BILIARY TRACT AND DUODENUM. (E.) Ludwick, J. R. (U. Michigan Med. Ctr., Ann Arbor) and P. Bass. Surg. Gynec Obstet. 124(3):536-546, 1967.

Contractile and electrical activities of the extrahepatic biliary tree and duodenum were monitored in dogs and monkeys which had been previously prepared with extraluminal strain gauge transducers and extracellular electrodes. No contractile or electrical activity could be detected from the common bile duct of the dog; in the monkey occasional spike potentials and low amplitude contractions occurred. No activi was recorded from the resting gallbladder in either species. Monkey duodenum did not show basic electrical rhythm as in the dog. Contraction of the intact bile duct (monkey) i response to epinephrine and 4-(m-chlorophenylcarbamyloxy)-2-butynyltrimethyl ammonium

ride suggests that the adrenergic system has
le in the activity of the common bile duct.
ecystokinin, methacholine, and morphine did
affect the bile duct. The gallbladder showed
ractile activity during the digestive period.
ecystokinin and methacholine induced con-
tions, epinephrine, 4-(m-chorophenyl-
amyloxy)-2-butynyltrimethyl ammonium chloride,
droxytryptophan and morphine did not. Chole-
okinin stimulated the duodenum to contract in
dogs and monkeys.

MODIFICATION OF THE CONTRACTILITY OF THE SPHINCTER OF ODDI BY CENTRAL ANALGESICS.
.) Juvara, I. (Cantacuzino Hosp., Bucharest)
D. Radulesco. Rev. Int. Hepat. 17(1):55-63,
7.

ee analgesics, frequently employed in the
ical and surgical treatment of biliary dis-
ers, cause strong contraction of the sphincter
ddi at the outset of therapy. These drugs
(1) dihydromorphinone-HCl, (2) pethidine and
a derivative of the group of heptanones (6-
thylamino-4,4-diphenyl-3-heptanone hydrochlor-
known as methadone HCl. The doses of these
ounds which are most active on the sphincter of
are identical with those employed for
gesia. To reduce the constriction of the
ncter, the spasmolytic activities of amyl
ite, atropine, chlorpromazine, and procaine
studied when admin. in the presence of the
gesics. The tests were made on 20 patients
biliary drains following cholecystectomy
mpanied with an exploration of the main bile
, but no operative sequellae or disease in
region. The intraductal pressure was
rded by a transducer, the variations of
age amplified and recorded as pressure changes,
le the bile duct was perfused at the constant
e of 1.5 ml/min.; external diameters of the
ducts exceeded 4 mm. The admin. of the
tral analgesics produced a strong increase of
sure in the main bile duct. Dihydromorphinone
ng i.v.) caused a pressure rise of 17 cm H_2O
2 min. Inhalation of 3 minims of amyl
rite abruptly and completely reduced the
ess pressure; the effect lasted only 5-6 min.
could be repeated during the period of
dual relaxation of the sphincter. On the
er hand, atropine (0.5 or 1 mg i.v.) had no
ion upon the contraction of the sphincter.
caine (20 ml 0.75% i.v.) had a variable
ect in some cases, not changing the pressure
others, causing a slow decline which did not
urn to the base pressure in the 45-min.
erimental period. Pethidine (50 mg i.v.) had
same pressure and time relationships with
pect to amyl nitrite and atropine. Chlor-
mazine was ineffective. Methadone (10 mg i.v.)
duced the greatest rise in the intraductal
ssure (about 18 cm H_2O); this was not reduced
atropine; amyl nitrite caused only a slight
transitory drop in pressure.

7904 COMPARISON BETWEEN SHAM FEEDING MEAT AND TEASING WITH MEAT ON CANINE GASTRIC MOTILITY.

(E.) Schapiro, H. (U. Tennessee Med. Units, Memphis), L. G. Britt and S. R. Evans. Amer. Surg. 33(6):499-500, 1967.

Three dogs were prepared with esophagostomies and gastric cannulae, and 3 dogs were prepared only with gastric cannulae. After a 15-20 min. control period, the animals were sham fed meat or teased with meat for a 5-10 min. period. In 5 studies on 3 dogs, the effect of sham feeding meat was an immediate and striking inhibition of gastric motility which lasted over 40 min. Nine experiments were performed on 6 dogs (3 of which had been used for sham feeding studies) to ascertain the effect of teasing with meat; in none of these was the gastric activity altered in any way during or for 30 min. after teasing with meat. This lack of response occurred during the period that the animals were secreting acid gastric juice. These results seem to indicate that a dissociation can exist between gastric secretion and gastric motor activity, and that, in all probability, different vagal centers exist to control these gastric functions.

7905 EFFECT OF MECHANORECEPTOR STIMULATIONS OF DIFFERENT INTENSITIES ORIGINATING FROM THE STOMACH AND LUNGS ON THE AFFERENT IMPULSATION OF THE CERVICAL VAGUS.

(E.) Varbanova, A. (Inst. Physiol., Bulgarian Acad. Sci., Sofia) and V. Sokolov. Acta Physiol. Acad. Sci. Hung. 31(2):107-113, 1967.

Acute experiments were done on immobilized artificallly-respired cats. Afferent vagal activity was led off by silver electrodes placed on the distal end of the vagus in the cervical region. The stomach was stimulated by 10-min. and 10-sec. distentions of a balloon introduced through the esophagus. The lungs were stimulated by the introduction of additional air into the system of respiration. At the beginning of stimulation vagal impulses were inhibited for a definite period, the duration of which was directly proportional to the intensity of stimulation (5-20 mm Hg). Upon stimulation, the vagal impulses gradually increased in amplitude reaching their highest values after the highest pressures over some tens of min. After reaching this max., the impulses gradually returned to the initial level. Compared with the period preceding stimulation, tonic vagal impulsation showed an increase in frequency which did not change during the entire period of stimulation, despite an increase in amplitude. Following stimulation, phasic vagal impulses gradually decreased in frequency parallel with the increase in amplitude.

7906 ELECTRICAL AND MECHANICAL ACTIVITIES IN THE STOMACH OF THE DOG: EFFECTS OF THE VAGUS NERVE STIMULATION, ATROPINE, NEOSTIGMINE AND ADRENALINE.

(E.) Sakamoto, S.

(Kumamoto U. Med. Sch., Japan) and K. Nishi. Kumamoto Med. J. 20(1):25-38, 1967.

Thirty adult dogs, starved for 24 hr., were anesthetized by i.v. inj. of amobarbital (50 mg/kg) and the abdominal cavity was widely opened by midline incision to expose the entire stomach. Suction Ag-AgCl electrodes were placed on serosal side of the pylorus and antrum, with the reference electrode fixed in the center of the abdominal wall and grounded. To record gastric mechanical activity at the site of electrodes, a fine silk thread was inserted and fixed into the muscular layer of the stomach, and the other end of the thread was connected to a strain gauge. Vagi were exposed and dissected free in the neck region, and the peripheral ends of the left vagus nerve were connected to a stimulator. Pulses of 0.1 msec. were delivered at 1-40 pulses/sec. Respiration was controlled by artificial respirator when necessary, and dogs were warmed by infrared lamp. Resting activity consisted of a rhythmic train of triphasic spikes (1 sec., 5-10 mV), each followed by a slow (5 sec.) spike potential of smaller amplitude. In most cases cervical vagotomy had no effect on electrical and mechanical activities of the stomach. Repeated high frequency vagal stimulation caused an increase in peristalsis of the stomach, an increase in duration and amplitude of the slow potential, and prolonged the intervals between potential changes. Atropine sulfate (0.02 mg/kg i.v.) gradually reduced mechanical activity, quickly abolished peristaltic movements, and markedly reduced amplitude of slow potentials. Not even atropine at a conc. of 0.1 mg/kg was sufficient to change the intervals between successive spikes. Effects of neostigmine bromide (0.2 and 0.5 mg/kg i.v.) were not consistent, although it generally increased the amplitude of the slow potential. Epinephrine (0.01 mg/kg i.v.) produced prolonged and irregular intervals between spikes in normal and atropinized stomachs. Tetrodotoxin (10^{-5} g/kg i.v. or by intra-arterial inj. at site of recording electrodes) abolished neither spike nor slow potential.

7907 ELECTROGASTROGRAPHIC CHARACTERISTICS OF GASTRIC MOTILITY DURING DIGESTION AFTER REMOVAL OF INTERVERTEBRAL NODES T6-T10. (Rus.) Sobakin, M. A. (Inst. Nutr., Acad. Med. Sci. USSR, Moscow) and N. P. Neverova. Eksp. Khir. Anest. 12(1):30-33, 1967.

Five dogs with a Basov gastric fistula were studied. When gastric innervation was preserved, the motor gastric function was characterized by a steady rhythm (5 waves/min.; the amplitude of the electrical waves varied from 2-6 mvolts) and strong peristaltic waves. Electrogastrographic study showed that removal of intervertebral ganglia at the level of the sixth-tenth thoracic segments depressed the strength of digestive motility (amplitude of electric waves decreased from 2-6 to 0.6-0.7 mvolts in 2 dogs), while the rhythm of the peristaltic waves remained unchanged. Such changes were preserved during 6 mo. of observation in 1 of 2 dogs, and in the other the strength of digestive motility began to be restored after 4 mo. but had not reached normal values even at 8 mo. In three other dogs, observed at 1 wk and at 1 or 2 mo., the decreased strength of digestive motility was somewhat less pronounced, and the rhythm remaine unchanged.

7908 A CONTRIBUTION TO THE STUDY OF THE RELATIONS BETWEEN MOVEMENTS OF CALCIUM AND THE HISTAMINE CONTRACTION OF SMOOTH MUSCLE. (Fr.) Carron, C. (Fac. Pharm., Paris). J. Physiol. (Paris) 59(1)(Suppl.):10-94, 1967.

An extensive study is made on the action of the Ca ion on the smooth muscle of the ileum of the guinea pig and the interaction of the Ca ion and histamine in the contraction of this smooth muscle. The part played by Ca in the contraction of smooth muscle *in vitro* in terms of the conc. and degree of ionization of Ca salts dissolved in the medium was the starting point. The results reveal certain new facts. The relationship between the amplitude of the histamine contraction of the isolated ileum of the guinea pig, the degree of ionization of Ca salts, and the Ca exchanges between the organ and its environment have been analyzed. It has been shown that the efflux of this element from the tissue is independent of the Ca content of the physiological soln. The influence of temperature and aeration upon Ca shifts was demonstrated. An increase in the movement of C from the intestine, in response to histamine, has been observed only if the Tyrode soln. contains some Ca. The disappearance of contractility of the isolated ileum following decalcification by sodium phosphate, and the recovery of contractility when the organ is replaced in a normal medium makes possible the demonstration of the specific role of exchangeable Ca ion, a phenomenon probably confined to the membrane. The part played by Ca ion in the mechanism of contraction may follow these stage (1) Histamine releases some Ca from some compartment in the vicinity of the membrane; this Ca diffuses into the external environment, ana also, on the other side of the membrane, towards deeper intracellular spaces; concomitan y histamine causes movement of Na and K, causing membrane depolarization and passage of the action potential. (2) The intracellular shift of Ca is towards the contractile elements of th smooth muscle fibers where adsorption produces contraction. (3) Reversal occurs during relaxation.

7909 NEW FINDINGS ON THE DISCHARGE OF VAGAL MECHANORECEPTORS OF THE INTESTINE. (Fr.) Mei, N. (Neurophysiol. & Psychophysiol. Inst., Marseille, France). C. R. Soc. Biol. (Paris) 160(12):2382-2387, 1966.

(2-4 kg) under anesthesia were used to
y the action potentials in the mechanorecep-
of the smooth muscle and mucosa of the
enum, jejuno-ileum, and large intestine
ciated with the intestinal plexi and afferent
lses in the vagus nerve. The appropriate
on of the intestine was opened in a suitable
ainer so that the temperature was maintained
7°C and the intestinal tissues retained their
al vascular and nervous connections.
lity of the intestine, the action currents,
ations of pressure in the intestinal wall
the pneumogram were simultaneously recorded.
r a receptor had been located and the
ous pick-ups (electrodes, etc.) were placed,
rdings were taken during 1) annular
trictions (3-5/min.) moving aborally
istalsis), 2) standing annular constrictions
ess amplitude than the preceding (about
in.) segmentation waves, and 3) the application
ight pressure. Spontaneous discharges of
anoreceptors were recorded; these coincided
pressure changes in the intestinal wall due
ontraction of the circular smooth muscle
er of the peristaltic or the segmenting type.
these action currents were not in motor
es was proved by the application of light
sure which caused a discharge of a train of
lses continuing for some time after cessation
ressure. Such receptors have been found in
duodenum, the jejuno-ileum and in the
imal ascending colon. The transmission of
e impulses in the vagus has been observed in
rs with a rate of conduction of 0.8-1 m/sec.,
ing these fibers in the C class. The
ptors in the mucosa do not ordinarily dis-
ge when the circular muscle beneath the
sa contracts; it is thought that they are
lly stimulated when the intestinal content is
ive or rough in the region.

SELECTIVE LOSS OF RESPONSIVENESS TO
ALPHA ADRENERGIC RECEPTOR STIMULATION
R COLD STORAGE OF THE RABBIT INTESTINE.
Lum, B. K. B. (Marquette U. Sch. Med.,
aukee, Wisc.), R. D. Heilman and M. A.
t. Europ. J. Pharmacol. 1(2):109-113, 1967.

ated segments of rabbit intestine (duodenal
ileal from the first and last 12 cm, resp.;
nal from sections more than 25 cm distal to
ach) were set up for recording of isotonic
itudinal muscle contractions. Responses to
athomimetic amines were measured in terms of
ction in tone produced by drug. Drugs were
wed to act for 1-2 min. before washout with
er's soln.; 5 min. was allowed to elapse
re the next dose; phentolamine (2.5 and 10 μg,
lenum; 5 and 10 μg, ileum) and pronethalol
& 40 μg, duodenum; 10, 20 & 40 μg, ileum) were
n. immediately after a preceding washout.
h preparations were used within 2 hr. of sac-
ce of animal; stored preparations were kept
00 ml Ringer's soln. at 6-8°C for 24 hr. or
. Dose ratios were calculated as follows: (ED$_{50}$
gonist in the presence of antagonist/(ED$_{50}$
of agonist in absence of antagonist). Intrinsic activity was calculated as (magnitude of max. response to sympathomimetic agent/(magnitude of max. response to norepinephrine). The drugs used were methoxamine, norepinephrine, epinephrine, nicotine, 1,1-dimethyl-4-phenylpiperazinium. Drugs were dissolved in physiological saline and soln. of catecholamines were acidified (0.2 ml HCl/100 ml) to retard oxidation of amines. With ileum and duodenum, the α-adrenergic blocking agent, phentolamine, antagonized the intestinal relaxation induced by methoxamine, an α-receptor stimulant, but not that produced by isoproterenol, a β-receptor stimulant. Opposite results were observed with pronethalol, a β-adrenergic blocking agent. This is consistent with the suggestion that stimulation of either α- or β-receptors can produce intestinal relaxation. Storage of duodenal and jejunal preparations reduced or abolished the intrinsic activity of methoxamine, but not that of epinephrine, norepinephrine, or isoproterenol. Cold storage impairs α-, but not β-, receptor activity. Ileum showed a greater resistance to cold storage.

7911 ACTION OF FUNCTIONAL TESTS ON INTEROCEPTIVE POSITIVE AND INHIBITORY CONDITIONED REFLEXES FROM MECHANORECEPTORS OF THE SMALL INTESTINE. (Rus.) Shapovalova, K. B. (Pavlov Inst. Physiol., Acad. Sci., Leningrad, USSR). Zh. Vyssh. Nerv. Deiat. Pavlov 16(5): 795-804, 1966.

Three dogs were provided with a Thiry-Vella fistula. Conditioning stimulants included light, electrical stimulation, bell and interoceptive stimuli (expansion of thin-walled rubber balloon in the lumen of an intestinal loop). Positive and inhibitory interoceptive conditioning reflexes displayed prolonged and marked changes after tests designed for interoceptive analysis and any change in stereotype; i.e., a special arrangement of light signal after release of exteroceptive differentiation did not influence positive and inhibitory exteroceptive conditioned reflexes, but produced a marked decrease of salivation on the interoceptive conditioning signal. Dogs with good mobility (exposed to tests directed toward exteroceptive analysis) showed that positive and inhibitory conditioned reflexes from mechanoreceptors of the small intestine differed by a certain degree of inertness, i.e., an exteroceptive positive stimulus, especially used at the site of exteroceptive differentiation, produced the usual result, while an interoceptive positive conditional stimulus at the site of interoceptive differentiation acted as an inhibitory signal. Poor conc. of the inhibitory process, produced by an interoceptive differentiating stimulus, was observed; i.e., during the prolongation of interoceptive differentiation, the latter was released, and all dogs showed marked consecutive inhibition after use in stereotypes of interoceptive differentiation. For example, if (after special admin. of a stereotypic signal, i.e., a light) consecutive inhibition was observed briefly (less than 1 min.), then the size of the conditioned reflex after interoceptive stimulus, used as a stereotype 4 min. after interoceptive differentiation, was markedly decreased; i.e., consecutive inhibition, interoceptively analyzed, was of a more prolonged and deep character.

7912 THE EFFECT OF H AND LACTATE IONS ON THE ELECTRICAL ACTIVITY AND CONTENT OF HIGH ENERGY PHOSPHATE COMPOUNDS OF TAENIA COLI FROM THE GUINEA PIG. (E.) Aaberg, G. (U. Gothenburg, Sweden), E. Mohme-Lundholm and N. Vamos. Acta Physiol. Scand. 69(3):129-133, 1967.

Reduction of the pH in Krebs soln. by 0.05-0.4 by adding lactic acid or acetic acid to a final conc. of 0.1-1.0 mmole/liter or by increasing the CO_2 conc. from 3-12% (pH change 0.28) in the gassing mixture caused relaxation of isolated taenia coli from the guinea pig. In determining the electrical activity of the membrane of the muscle by the sucrose gap method, it was found that a pH reduction inhibited the action potential, and with even lower pH values hyperpolarization was observed. In K-depolarized muscle a similar pH reduction had a tension-increasing effect. Na-lactate increased the electrical activity of the membrane and had a tension-increasing effect. The addition of lactic acid in a conc. of 1 mmole/liter, which relaxed the carbacholine-stimulated muscle had no effect on the content of high energy phosphate compounds. It seems probable that the relaxing effect of H ions was a result of its inhibitory effect on the electrical activity of the membrane.

7913 EFFECT OF GRAVITATIONAL AND INERTIAL FORCES ON PLEURAL AND ESOPHAGEAL PRESSURES. (E.) Rutishauser, W. J. (U. Minnesota, Rochester), N. Banchero, A. G. Tsakiris and E. H. Wood. J. Appl. Physiol. 22(6):1041-1052, 1967.

7914 INTRAESOPHAGEAL PRESSURE GRADIENT IN MAN. (E.) Banchero, N. (U. Minnesota, Rochester), P. E. Schwartz, and E. H. Wood. J. Appl. Physiol. 22(6):1066-1074, 1967.

7915 MOTOR ACTIVITY OF THE LARGE INTESTINE IN NORMAL DOGS. (Rus.) Danielian, G. A., E. Kh. Sarkisian and A. M. Galstian. Zh. Eksp. Klin. Med. 7(1):8-12, 1967.

7916 STIMULATORY EFFECT OF TOLAZOLINE ON SMOOTH MUSCLE. (E.) Džoljić, M. (U. Zagreb, Yugoslavia). Brit. J. Pharmacol. 30(2): 203-212, 1967.

7917 INACTIVATION OF HISTAMINE AND OCCURREN OF SMOOTH MUSCLE STIMULATING ACTIVITY IN PLASMA OF SHEEP. (E.) Sjaastad, Ö. V. (Vet Coll. Norway, Oslo). Quart. J. Exp. Physiol. 52(3):331-342, 1967.

7918 EFFECT OF VASODILATORS UPON THE ISOLAT TAENIA COLI OF THE GUINEA PIG. (E.) Imai, S. (Tokyo Med. Dent. U.) and K. Takeda. J. Pharmacol. Exp. Ther. 156(3):557-564, 1967.

7919 LOCALIZATION OF NORADRENALINE AND ACETYLCHOLINESTERASE IN THE TAENIA OF THE GUINEA PIG CAECUM. (E.) Åberg, A. (U. Helsinki) and O. Eränkö. Acta Physiol. Scand. 69(4):383-384, 1967.

7920 ANTISPASMODIC ACTIVITY IN VITRO OF SOM PENTOXYVERINE DERIVATIVES. (E.) Wellens, D. (Union Chim. Belge, Brussels). Arzneimittelforschung 17(4):495-497, 1967.

7921 RESISTANCE TO THE EFFECT OF CARBACHOL ON THE CARDIOVASCULAR SYSTEM AND ON TH ISOLATED ILEUM OF RATS AFTER SUBACUTE ADMINISTR TION OF AN ORGANOPHOSPHORUS CHOLINESTERASE INHI BITOR. (E.) McPhillips, J. J. (Med. Coll. Virginia, Richmond) and M. S. Dar. J. Pharmaco Exp. Ther. 156(3):507-513, 1967.

7922 THE FLOW OF ORGANIC AND INORGANIC MATERIALS THROUGH THE ALIMENTARY TRACT OF THE SHEEP. (E.) Bruce, J. (Rowett Res. Inst., Aberdeen, Scotland), E. D. Goodall, R. N. B. Kay, A. T. Phillipson and L. E. Vowles Proc. Roy. Soc. B. 166:46-62, 1967.

7923 AN ANALYSIS OF THE RESPONSES OF THE ISOLATED PORTAL VEIN OF THE RABBIT TO ELECTRICAL STIMULATION AND TO DRUGS. (E.) Hughes, J. (Roy. Coll. Surg. England, London) and J. R. Vane. Brit. J. Pharmacol. 30(1):46-6 1967.

7924 SMALL INTESTINAL MOTILITY. (E.)(Rev.) Farrar, J. T. (Med. Coll. Virginia, Richmond) and A. M. Zfass. Gastroenterology 52(6):1019-1037, 1967.

See also abstract nos.: 7705,7710,7727,8184

FETAL LIVER: A SOURCE OF IMMUNOGLOBULIN PRODUCING CELLS IN THE MOUSE. (E.) n, M. L. (U. S. Naval Radiol. Defense Lab., Francisco, Calif.), L. J. Cole and L. A. zenberg. Proc. Soc. Exp. Biol. Med. 124(4): l-1163, 1967.

lve-wk.-old thymectomized and nonoperated 7L x A)F_1 mice received 870 rad whole body rradiation and immediately thereafter were en an i.p. inj. of 33 x 10^6 nucleated cells ived from livers of 17-day (C57Bl/6 x C57Bl/6) ryos. Donor type γ-globulin was first detected small quantities 30 days after inj. of donor ls; by 45 days after irradiation, both the operated and the thymectomized mice had reciable quantities of donor type γ-globulin their sera. At 58 days all of the mice had rox. the same levels of donor and host type lobulins. Additional chimeras were produced ng fetal liver cells from 14-21 days (C57Bl/6 x Bl/6) embryos; all mice, thymectomized (21) well as intact (10) had significant amounts donor-type γ-globulins in their sera. These e sensitized to a synthetic polypeptide and ir sera were tested for total and (in 3 cases) donor-type anti-polypeptide antibody. All of fetal liver cell chimeras (intact thymus) proced specific antibody (10 of 10), but none of thymectomized chimeras (0 of 21) had detectle antibody. Of the 3 mice tested in the intactymus group, from 10%-75% of the specific antidy was donor in origin. These findings show at cells derived from fetal liver are capable producing γ-globulins whether placed in thyctomized or in intact irradiated hosts.

26 EXCHANGE OF INJECTED LABELED RED CELLS IN LIVER TISSUE DURING HEMORRHAGIC OCK. (E.) Andersen, D. (Cook County Hosp., icago, Ill.) and W. C. Shoemaker. Proc. Soc. . Biol. Med. 125(1):30-34, 1967.

e RBC content in liver was measured in normal d in shocked dogs using 2 independent methods measurement (radioassay, cells labeled with Cr, and chemical assay). The mean conc. of C in the liver of a series of animals under ntrol conditions was 0.027±0.002 ml/g liver ssue. After hypovolemic shock and retranssion of shed blood, the RBC content in liver ssue increased to an av. of 0.052±0.006 ml/g. is difference from control samples was gnificant. Under control conditions, the RBC bel of peripheral blood was mixed adequately th the RBC in liver tissues. After shock, fferentially labeled RBC mixed more slowly th the RBC in the liver, and in some instances d not become equilibrated during the course of e experiments. This suggested a pool of ncirculating or slowly circulating RBC in the ver after shock. Such changes may affect lversely the precision and interpretation of lood vol. measurements made by conventional echnics and sampling schedules.

7927 ACETYLCHOLINE IN THE CONTROL OF AMYLASE ACTIVITY IN PERFUSED, ISOLATED RAT LIVER. (It.) Brighenti, L. (U. Ferrara, Italy), C. Ottolenghi, L. Passerini and O. Barnabel. Boll. Soc. Ital. Biol. Sper. 42(24):1971-1975, 1966.

Isolated livers from adult, male rats, fasting 18 hr., were perfused with a liquid containing 15 ml washed rat RBC, 45 ml buffered Krebs-Ringer soln. (containing 5% crystallized bovine albumin) and 10 ml of a soln. containing 400 mg of acid hydrolysate of casein, 1 mg L-tryptophan, 3 mg tyrosine, 100 mg glucose, 5000 I.U. heparin, 6000 I.U. penicillin and 3 mg streptomycin. Addition of neostigmine (0.25 mg) plus acetylcholine (1.0 mg) to the perfusion liquid, repeated after 1 hr., increased the amylase activity of the liquid by approx. 100% as compared to a control, although neither substance alone exerted any appreciable effect. Inj. of actinomycin D into the donor animal (100 μg/100 g, 30 min. prior to sacrifice) plus addition of 100 μg to the perfusion liquid, completely inhibited the response to acetylcholine, indicating that the latter was mediated by some affect on RNA turnover. In a series of corollary experiments, addition of puromycin to the perfusion liquid (8 mg, repeated after 1 hr.) had no effect on amylase activity, of itself, but inhibited response to acetylcholine significantly, suggesting that the latter's stimulatory effect was linked to the synthesis of new protein molecules.

7928 GLYCOGEN SYNTHETASE ACTIVITY IN LIVER: REGULATION BY THE AUTONOMIC NERVES. (E.) Shimazu, T. (Osaka U. Med. Sch., Japan). Science 156(3779):1256-1257, 1967.

Under anesthesia, the left vagus nerve of rabbits was exposed immediately below the diaphragm, and a bipolar platinum electrode was placed on the nerve; after 15-20 min., one lobe of liver was quickly removed by ligation and was immersed in liquid nitrogen. Stimuli were applied to the vagus nerve (5 or 20 volts; 100/sec.; 3 msec.) or the splanchnic nerve (40 volts; 100/sec.; 3 msec.); after stimulation, the other lobe of the same liver was similarly removed while the stimulus was still being delivered. Total activity of liver glycogen synthetase, assayed in the presence of glucose-6-phosphate, was greatly increased by electrical stimulation of the vagus nerve, almost attaining max. within 5 min. The glucose-6-phosphate-independent activity of liver glycogen synthetase, assayed without glucose-6-phosphate, changed insignificantly before and after vagal stimulation. The increase in total activity after stimulation can be attributed to an increase in glucose-6-phosphate-dependent activity of the enzyme. The effect was completely counteracted by simultaneous stimulation of splanchnic nerves, although stimulation of splanchnic nerves alone had little effect on the enzyme. When anesthetized rabbits were inj. i.v. with insulin (2 U/kg) free of glucagon, both types of glycogen synthetase increased gradually during 15-20 min. after inj. The effect of vagal stimulation on glycogen synthetase activity of the liver is unlikely to be a secondary effect of insulin secreted from the pancreas, since pancreatectomized and intact rabbits gave essentially the same results. It is concluded that there is a dual regulatory system, hormonal and nervous, in glycogen metabolism in the liver, and that the nervous regulation is much more rapid than the hormonal.

7929 ANDROGENIC CONTROL OF A SEX-DEPENDENT PROTEIN IN THE RAT.

(E.) Roy, A. K. (Wayne State U. Sch. Med., Detroit, Mich.) and O. W. Neuhaus. Nature (London) 214(5088): 618-620, 1967.

A dependency of urinary proteins on the sex of the rat was demonstrated by paper electrophoresis. The α-globulin region, which is the chief protein component of male urine, is absent in the female urine. The urinary proteins of the normal female rats appear to be derived mainly from the plasma; the chief component migrated in a similar fashion to serum albumin. Ovariectomized rats, treated with 10-15 daily inj. of testosterone propionate (1 mg/100 g), excreted a new component which migrated in the same position as purified α_{2u} from male urine. Also demonstrated was the sex dependence of a liver protein which is precipitated by specific anti-rabbit antiserum; the protein was observed in the normal male liver, but not in that of the female. Earliest appearance of α_{2u} in the male liver occurred at 40 days (puberty) and also in the urine at this time. Normal daily excretion of α_{2u} in the male reached a max. of 63 mg daily by 60 days of age. Castration at this age reduced excretion to a minimum of 15-25 mg daily; castration before puberty yielded a low level of excretion, which reached 7-10 mg of protein by the time the rats were 60 days old. When these rats were given testosterone propionate (1 mg/100 g daily), a sharp increase to the normal α_{2u} excretion was observed after 8-9 days of treatment. Withdrawal of the testosterone after 80 days yielded a gradual reduction in the excretion of the protein. The action of testosterone appears to be an induction of an expression of normally repressed genetic information in terms of the synthesis of α_{2u} protein. Hepatic excretion of α_{2u} was completely abolished in males given 7 daily inj. of 1 mg estradiol dipropionate/100 g.

7930 A METHOD FOR DEMONSTRATING TRYPTOPHAN PYRROLASE ACTIVITY IN THE HUMAN LIVER.

(It.) Chiancone, F. M. (Lepetit S.p.A., Milan, Italy), E. Ginoulhiac, L. T. Tenconi and U. Bonomi. Acta Vitamin. (Milano) (6):225-234, 1966.

In 4-mo.-old Wistar rats, tryptophan pyrrolase activity in liver homogenates increased progressively and significantly when the liver was left in situ after sacrifice and the animal kept at room temperature for periods up to 18 hr Conversely, the activity was decreased sharply and progressively in homogenates stored at 2°C for as little as 4 hr. Both the rate and extent of loss were decreased when homogenates were frozen in dry ice. In human studies, no tryptophan pyrrolase activity was demonstrable in liver homogenates derived from 6 premature infants and stored in dry ice. Values ranged from 0.37-2.63 μmoles kynurenine/hr./100 mg nitrogen in homogenates derived from 5 of 6 neonates at term, with no activity demonstrable in the homogenate derived from the sixth. In homogenates derived from 3 adults, 25-40 yr. old values were zero, 1.01 and 1.37, resp. Identification of the enzyme was confirmed by a number of activation tests.

7931 PHYSICAL ACTIVITY AND LIVER CHOLESTEROL

(E.) Gollnick, P. D. (Washington State U., Pullman) and S. W. Simmons. Int. Z. Angew. Physiol. 23(4):322-330, 1967.

Male Sprague-Dawley rats were fed a synthetic rat diet consisting of lard, 24.2%; casein, 18.0%; sucrose, 13.4%; dextrin, 20.2%; salts, 1.7%; cod liver oil, 1.0%; agar, 3.3% and the known vitamins; water was added in the amount of 1.4 times the wt. of the dry constitutents. Food intake was controlled by pair-feeding the rats in groups of 4. In Experiment 1, 52 rats (av. initial body wt. approx. 320 g) were divided into 4 groups; 3 groups were trained for 12 wk. by swimming in water at 35°C for 15 min./day, 30 min./day and 60 min./day, resp. The fourth group served as unexercised controls. The latter gained significantly more wt. than exercised animals, whose absolute liver and spleen wt. was significantly less than controls. The adrenals of trained rats were heavier than controls. Nonexercised rats had higher liver cholesterol levels/g and also for total liver; increasing exercise beyond 15 min. did not produce a further reduction in liver cholesterol. Free plasma cholesterol was unaltered by training, while total plasma cholesterol was significantly lower only in the group of rats exercised 60 min./day. Exercised animals excreted significantly more sterol in feces than nonexercised controls. In a second experiment, rats (av. initial body wt. 90-100 g) were trained to run in motor-driven work wheels; during the initial 4 wk. the speed and duration of daily exercise were progressively increased until rats were capable of running for 60 min. at 1.0 miles/hr. Training was continued at this level for 4 additional wk. At the end of this period, 1 group of rats was removed from the training program, while a second group was progressively detrained for 4 additional wk. by reducing the exercise by 2 min./day; a third group of rats continued the daily 60-min. run throughout the entire experimental period, and a fourth group of unexercised rats were controls. The adrenals of all exercised groups were nificantly heavier than those of controls; ever, adrenals of those that detrained and sed to train were lighter than those of the up that trained the entire 12-wk. period at a n work load. Plasma cholesterol was not ered by any training program. Cholesterol c. in livers of the exercised groups was nificantly lower than that of controls; this nge seemed to be unstable since the difference ween the control group and the group that sed to train was not significant and the er cholesterol level of the determined group o appeared to be increasing. These findings icate that high fat diets produce a progressive umulation of cholesterol in the livers of s which can be retarded by exercise. The vated excretion of cholesterol (fecal sterol retion was significantly higher in trained s) may be one of the methods by which rcise retards the accumulation of cholesterol the livers of rats fed high fat diets.

2 INDUCTION OF NUCLEIC ACID SYNTHESIS OF THE LIVER DURING PARTIAL HEPATECTOMY PARABIOSIS. (Ger.) Wrba, H. (German Cancer . Ctr., Heidelberg, Germany), H. Rabes and G. er. Exp. Cell Res. 46(2):263-267, 1967.

parabiotic rats (250-300 g), after 4 days re was a definite anastomosis of the culatory systems; 4 days after parabiosis the t partner of 8 pairs was partially hepatectozed (67%); 4 other parabiotic pairs of rats rved as controls. The normal partners of the rabiotic rats and 1 partner of the parabiotic ntrols each received 100 μc thymidine-6-T, ecific activity 1.9 c/mM i.p.; the radiotivity of the blood of the parabionts was still ual 2 hr. after inj.; the liver was excised at hr. after radioactive thymidine inj. Radiotivity of the liver of the unoperated paraonts was compared to that of the controls. dioactivity av. 27 cells/10,000 counted cells the unoperated parabionts compared to 5.5 lls/10,000 of the controls. This av. was sed on liver samples taken from 2-96 hr. after ymidine inj. This induction of nucleic acid nthesis in the unoperated parabiont indicates me type ·f hormonal control of regeneration.

33 TRANSAMINASE ACTIVITY IN SUBCELLULAR FRACTIONS OF THE NORMAL AND REGENERATING T LIVER. (E.) Bengmark, S. (U. Goteborg, eden), R. Ekholm and R. Olsson. Acta epatosplen. (Stuttgart) 14(2):80-88, 1967.

e activities of glutamine-oxalacetic transaminase d glutamic-pyruvic transaminase in subcellular actions of the liver were studied before and 2, and 14 days after partial hepatectomy in male rague-Dawley rats; unmasking of latent enzyme tivity in the mitochondrial fraction was perormed using ultrasonic disintegration. In the ormal liver, glutamic oxalacetic transaminase as located as follows: mitochondrial fraction, 77.4%; microsomal, 2.4%; nuclear, 1.7% and supernatant, 17.9%; the glutamic-pyruvic transaminase activity was as follows: mitochondrial fraction, 10.5%; microsomal, 2.5%; nuclear, 1.7% and supernatant, 85.3%. There was a marked elevation of SGPT activity on the second postoperative day in partially hepatectomized rats; this was accompanied by a reduction of total glutamic-pyruvic transaminase activity of the liver (due, in turn, to a decrease in this transaminase in the supernatant). Activity of this transaminase in the mitochondria was largely unchanged. On the second postoperative day, when SGOT was enormously elevated, the total glutamic-oxalacetic transaminase activity of the liver was little affected. The rise of SGOT was accompanied by an elevation of glutamic-oxalacetic transaminase activity in the supernatant fraction; activity of this transaminase in the mitochondria was decreased. The elevation of SGOT activity cannot be explained by simple leakage from the liver, since total glutamic-oxalacetic transaminase activity/mg of liver tissue remained unchanged. It is suggested that there is an increased synthesis of glutamic-oxalacetic transaminase in the liver postoperatively; this may be a primary phenomenon or a response to a previous loss of enzyme from the cell. As in the normal liver, transaminase activities in the nuclear and microsomal fractions of the regenerating liver were very low, and no significant changes that could be ascribed to the partial hepatectomy were observed.

7934 EFFECTS OF ADRENAL HORMONES UPON DNA SYNTHESIS IN REGENERATING RAT LIVER AND TUMORS. (E.) Sakuma, K. (U. Tokyo) and H. Terayama. J. Biochem. (Tokyo) 61(4):504-511, 1967.

In rats pretreated with cortisone (5 mg/day for 5 days before partial hepatectomy), the increase in DNA synthesis which normally occurs during the course of liver regeneration was greatly retarded, as was induction of the enzymes thymidine kinase and thymidylate kinase. Admin. of epinephrine (15-25 μg/hr. for 24 days) was also effective in inhibiting DNA synthesis and thymidine kinase induction in regenerating livers, but no such effects were produced with hepatoma cells. Whereas cortisone was effective when admin. repeatedly before partial hepatectomy in large doses, epinephrine was most effective when given in small quantities during an early period of liver regeneration, during which time the induction mechanism would still be operating; this effect was reduced when epinephrine was admin. later than 24 hr. after partial hepatectomy. It is suggested that the action of epinephrine may be more direct than that of cortisone, and that it may be acting at a stage preceding the S phase, probably at the "dichophase", of the mitotic cycle. Since cortisone is very effective in producing involution of lymphoid tissues and certain lymphoid cells play a role in tissue proliferation, it is possible to assume the reutilization of lymphocyte DNA by tissue cells undergoing regeneration. Therefore, the observed effects of cortisone may be explained as being due to its primary action upon the lymphoid tissues.

7935 HUMORAL CONTROL OF LIVER REGENERATION. (E.) Sigel, B. (Woman's Med. Coll. Pennsylvania, Philadelphia), L. B. Baldia, M. R. Dunn and H. Menduke. Surg. Gynec. Obstet. 124(5):1023-1031, 1967.

Studies were performed in order to evaluate several aspects of a hypothesis stating that liver regeneration is humorally controlled. The parabiotic rat preparation, in which 1 animal is submitted to partial hepatectomy and the livers of the nonoperated upon or both members of the pair are examined, has been the most frequently used method of studying humoral relationships in liver regeneration *in vivo*. However, in this study an experimental preparation was devised which was basically similar to rat parabiosis (in that liver tissue existed at 2 separate loci in the same biologic system), but which obviated some of the disadvantages of the parabiotic system. Mongrel dogs of both sexes underwent 2-stage autotransplantation of a portion of the left central liver lobe to an intestinal pedicle, and the effect of partial resection, Eck fistula, combined partial resection and Eck fistula, and sham operation upon the transplanted liver was observed on the grafts. Hepatocyte DNA synthesis was studied by admin. of tritiated thymidine and autoradiographic analysis. Hepatocyte DNA synthesis was found to be markedly increased in grafted as well as nontransplanted liver after partial hepatectomy, but no significant change in DNA synthesis at either site could be associated with Eck fistula. There was a significant correlation between the rate of hepatocyte DNA synthesis in the graft and its parent liver tissue. The combination of partial hepatectomy and Eck fistula resulted in extensive hepatocyte DNA synthesis in the nontransplanted liver remnant; and the effect of partial hepatectomy and Eck fistula upon the nontransplanted liver was greater than after partial hepatectomy alone, but not significantly so. It is concluded that after partial hepatectomy (partial liver resection), hepatocyte DNA synthesis appeared to be mediated by a humoral mechanism and not by hepatic blood flow.

7936 BILE ACID SYNTHESIS IN NORMAL AND HYPOPHYSECTOMIZED RATS: A RATE STUDY USING CHOLESTYRAMINE. (E.) Beher, W. T. (Henry Ford Hosp., Detroit, Mich.), B. Rao, M. E. Beher and J. Bertasius. Proc. Soc. Exp. Biol. Med. 124(4):1193-1197, 1967.

Twelve normal and 16 hypophysectomized, 6-mo.-old, Sprague-Dawley female albino rats were studied. The 12 normal animals were divided into 3 equal groups; 1 group, the controls, was fed ground Rockland rat rations, while the other 2 groups received the same diet supplemented with 1% and 2% cholestyramine (a nonabsorbable, bile acid-binding, anionic exchange resin added to increase the turnover rate of the bile acid pool). The hypophysectomized animals were divided into 4 equal groups; 3 of these received diets corresponding to those fed the normal rat groups, and a fourth received Rockland rat rations supplemented with 0.5% cholestyramine. After 1 wk. each received an i.p. inj. containin 5 μc (56 mc/mM) of cholic acid-24-^{14}C dissolved in 0.9% $NaHCO_3$. Either of 2 sequences involved in the elimination of tissue sterol by the bile pathway could be rate-limiting: 1) the conversi of sterols to bile acids, and 2) elimination of these bile acids from their pool. The bile acid pool sizes did not decrease when faster turnover rates were induced (by the action of cholestyramine); thus, the rate of bile acid elimination and not the rate of conversion of liver sterols to bile acids was found to be the rate-limiting sequence in both types of rats. It is concluded that thyroid, adrenal, gonadal or pituitary hormones do not directly influence the rate of conversion of sterols to bile acids in this species.

7937 THE EFFECT OF PORTACAVAL TRANSPOSITION ON THE INACTIVATION OF ANGIOTENSIN BY THE CANINE LIVER. (E.) Schwartz, D. T. (Columbia U., New York, N. Y.). Ann. Surg. 166(1):157-160, 1967.

The capacity of the canine liver to inactivate synthetic 1-L-asparaginyl-5-L-valyl angiotensin amide was measured by the pressor response to its infusion. This parameter was measured in normal dogs, and in those with portacaval transposition alone, renal artery stenosis alone, or both in combination. The pressor response to single inj. of angiotensin into the systemic vein was compared with pressor response to the same dose given across the liver. The capacity of the liver of normal dogs to inactivate angiotensin was 0.55±0.05 μg, when the dose was admin. in 10 sec.; the activity did not change significantly after portacaval transposition. The angiotensin-inactivating capacity of the liver of dogs with a renal artery stenosis and sustained arterial hypertension was measured as 0.66 μg angiotension, which was not significantly greater than the capacity of the normal liver to inactivate angiotensin. In dogs with renal artery stenosis and portacaval transposition, however, there was a significant increase in the capacity of the liver to inactivate angiotensin. At 3 wk. after constriction of the renal artery, 0.75 μg were inactivated, while after 1 yr., the capacity was 1 μg or approx. twice the normal. It is suggested that portacaval transposition performed in patients with chronic renal disease and hypertension may continue to protect against the latter, even if the renal disease progresses, once the blood pressure was initially brought to normal.

CONGRUENCE OF EXCRETORY FUNCTIONS OF LIVER AND KIDNEY: SULFONAMIDES. (E.) popoulos, A. (U. New Mexico Sch. Med., uquerque) and H. Sonnenberg. Amer. J. Physiol. (5):1117-1122, 1967.

retion of 20 sulfonamides by isolated perfused livers was compared with reported behavior the same compounds in renal excretory proses. Extensive metabolic alteration of most pounds by liver was demonstrated. Metabolites e isolated and examined for participation in al transport. In general, compounds that e actively transported by kidney were highly c. in hepatic bile. In both organs the retory process could be inhibited by benecid (0.05 mM). Conversely, compounds that e not transported by kidney were poorly conc. hepatic bile. In both organs excretion of h compounds was uninfluenced by probenecid. is concluded that liver and kidney possess a ilar mechanism for excretory transport of anic anions such as sulfonamides and that strate specificities for transport are ntical in the two organs.

9 HEPATIC MICROSOMAL ACTIVITIES IN RATS WITH LONG AND SHORT SLEEPING TIMES ER HEXOBARBITAL: A COMPARISON. (E.) Mitoma, (Stanford Res. Inst., Menlo Park, Calif.), E. Neubauer, N. L. Badger and T. J. Sorich, Proc. Soc. Exp. Biol. Med. 125(1):284-288, 7.

s (5 strains: Buffalo, Wistar, Fischer, g-Evans and Sprague-Dawley) were separated o 2 groups, long-sleepers and short-sleepers, the basis of their response to hexobarbital 0 mg/kg, admin. i.p.). The drug-metabolizing ivities of the hepatic postmitochondrial ernatant fraction from long-sleepers were s than those from short-sleepers with respect hexobarbital, acetanilide, aminopyrine and itroanisole, each of which represents a fferent drug-metabolism pathway; this trend observed in all 5 rat strains examined cept in the metabolism of o-nitroanisole by e Fischer rats. This difference was no longer served in Long-Evans rats after phenobarbital etreatment (only acetanilide and aminopyrine re tested). The livers of Wistar and Fischer ts showed the highest and Buffalo rats the west drug metabolizing activities among the 5 rains studied. The strain differences in ug-metabolism activities were not as great in e rat as those previously reported in various bbit strains. These findings are confined to ose drugs detoxified oxidatively by the ver microsomes.

40 MAXIMUM BILIARY EXCRETION OF BILIRUBIN AND SULFOBROMOPHTHALEIN DURING ESTHESIA-INDUCED ALTERATION OF RECTAL TEMPERARE. (E.) Roberts, R. J. (U. Iowa Coll. Med., wa City), C. D. Klaassen and G. L. Plaa. Proc. Soc. Exp. Biol. Med. 125(1): 313-316, 1967.

The influence of temperature on the max. biliary excretion of bilirubin and BSP was studied in anesthetized (pentobarbital; rats, 45 mg/kg, i.p.; mice, 80 mg/kg., i.p.) male Swiss-Webster mice and male Sprague-Dawley rats. Bilirubin soln. were infused at a rate of approx. 0.07 and 0.02 ml/min. in rats and mice, resp. BSP (50 mg/ml) was diluted in sufficient 0.9% NaCl to permit an infusion of approx. 0.03 ml/min. Mice showed a more rapid and greater fall in rectal temperature than rats after pentobarbital anesthesia, dropping approx. 10°C in 60 min.; rats showed a drop of 2.5°C over the same period. A decrease in body temperature significantly decreased the bilirubin transport max. in both rats and mice; a loss of body temperature in the rat also produced a significant decrease in the BSP transport max. In both rats and mice, bile flow showed a diminution corresponding with the decrease in rectal temperature. Bile flow and biliary transport max. data for bilirubin and BSP suggest that, in the rat, temperature has a greater effect on bile flow than on biliary excretion. This differential effect was more evident in bilirubin studies performed on mice; here, while bile flow diminished with hypothermia, the biliary conc. of bilirubin increased significantly. These observations lend support to the suggestion that formation of bile is a consequence of at least 2 separate mechanisms: 1 controlling the introduction of water and electrolytes, and the other controlling the active secretion of specific substances into the bile. The results of these experiments emphasize the importance of monitoring body temperature during the course of experiments employing max. biliary excretion as an endpoint.

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The uptake of free fatty acid and release of glucose, triglyceride, urea and ketone bodies by the isolated perfused (Sprague-Dawley) rat liver were measured, employing livers from normal or adrenalectomized animals, or from animals treated with cortisone. Release of glucose and triglyceride was depressed and output of ketone bodies was moderately stimulated after adrenalectomy. Uptake of free fatty acids and output of urea were not altered by adrenalectomy. When the adrenalectomized animal was treated with cortisone, the triglyceride and ketone body output was restored to normal values and the release of glucose was stimulated. Cortisol, added to the medium in vitro, stimulated output of triglyceride and glucose by the liver. A critical conc. of hormone was attained, below which there was no stimulation and above which there was inhibition of triglyceride release.

At this conc., cortisol stimulated triglyceride output by livers from normal rats and increased the depressed rate of triglyceride output observed with livers from adrenalectomized animals. This same amount of cortisol induced the max. output of glucose by livers from normal rats.

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See also abstract nos.: 7770,7778,7789,7847

DEGREE OF FLUORESCENCE IN THE PROGNOSIS
OF MALIGNANT TUMORS. (E.) Rachlin, L.
Hosp., Livermore, Calif.) and J. R. Harrower.
. J. Dig. Dis. 12(6):593-597, 1967.

0 patients studied for the presence of
racycline fluorescence in gastric and colonic
irates, there were 12 with confirmed gastric
ignancy and 18 with colonic malignancy. In
12 cases of gastric cancer, there were 7 (58%)
e-positive and 5 (42%) false-negative tests.
the 18 colon cancer cases, there were 10 (56%)
e-positive and 8 (44%) false-negative tests.
re were 15 cases of benign gastric lesions,
h 12 (80%) true-negative and 3 (20%) false-
itive tests. The 5 benign colon lesions
wed 2 (40%) true-negative and 3 (60%) false-
itive tests. In the total 50 cases, there
e 30 (62%) true tetracycline fluorescent
ts and 19 (38%) false tetracycline fluorescent
ts. There was no apparent relationship between
degree of fluorescence, as measured by the
tomicrographic sensing unit, and the extent
involvement by the tumor, as noted at the time
surgery or autopsy. The range of color in-
sity appeared to be totally inaccurate, since
greatest intensity (23.4) was recorded in a
se-positive test, and the av. for true-positive
sults was 5.9, just 5.3 U from the lowest color
tensity of 0.6, as noted at the time of surgery
autopsy. It is thought that the tetracycline
uorescence test as a screening procedure for
lignancies of the stomach and colon is of
estionable value, since the percentage of false
sts (both positive and negative) is too high.
e diagnostic unreliability and time involved in
eparation for the examination preclude the use
the tetracycline fluorescence test as a mass
reening test in the diagnosis of either gastric
colonic cancer.

85 ANGIOGRAPHY IN THE DIAGNOSIS OF
GASTROINTESTINAL BLEEDING. (E.) Baum,
(U. Pennsylvania Grad. Hosp., Philadelphia),
Nusbaum, K. Kuroda and H. J. Tumen. Arch.
tern. Med. (Chicago) 119(1):16-24, 1967.

dominal angiography gave positive information
the source of hemorrhage in 18 of 21 patients.
is technic is effective only when the patient
actually bleeding at a rate of more than 0.5
/min. at the time of examination. It may show
hat bleeding is occurring, but it may not reveal
he nature of the bleeding lesion. This method
ust be supplemented with other methods, although
are should be taken to perform angiography before
a examination, since Ba in the gastrointestinal
ract obscures angiography interpretation.
ngiography is safe and does not interfere with
ther methods of examination or delay urgent
urgery; it appeared to be especially valuable
n studying patients with cirrhosis (and intes-
inal bleeding), and esophagogastric varices.
elective abdominal angiography seems particularly
well adapted to discovering other than the obvious source of a hemorrhage, i.e., other lesions and varices.

7986 AN AUTOMATIC CARTRIDGE STAPLER. (E.) Cooper, P. (Albert Einstein Sch. Med., Bronx, N. Y.), R. F. Mallina and S. H. Tolins. Amer. J. Surg. 113(6):856-860, 1967.

An automatic stapler capable of individually dispensing 15 plastic staples from a presterilized, disposable cartridge is described and was sucessfully used in making secure anastomoses, closures and repairs in laboratory animals and human subjects. No complications occurred in the patients; stapling was used for the first layer of a duodenal stump closure, and for a common iliac arteriotomy closure. The instrument was set in a ring-handled hemostat frame, and in a tissue forceps frame. Neither form is significantly larger or heavier than those frames ordinarily used in surgery. Two staple sizes are available; one is 0.15 mm in diameter, 2 mm in width, and with a leg length of 2.5 mm; the other is 0.22 mm, 3 mm, and 3.5 mm. This individual stapler, unlike those which inject all staples in one line at once, allows the surgeon to follow any contour desired.

7987 STUDIES ON THE NUMBER AND TYPE OF ENZYMES OF THE GASTRAL, INTESTINAL AND RECTAL MUCOSA IN MAN. PART 3. ELECTROPHORETIC DIFFERENTIATION OF INTESTINAL ENZYMES AND THEIR MULTIPLE FORMS AND A COMPARATIVE ANALYSIS OF SERUM ENZYMES. (Ger.) Klein, U. E. (U. Clin. Kiel, Germany), H. C. Drube, H. T. Hansen and H. Mielke. Klin. Wschr. 45(5):244-251, 1967.

Patients operated for ulcer or carcinoma furnished mucosal tissue: 10 from the gastric fundus, 12 from the duodenal bulb, 9 from the first jejunal loop. Biopsies furnished tissues: 4 from the duodenum, 4 from the jejunum and 8 from the rectum of subjects without any gastrointestinal disorders. The tests for enzymes were undertaken on fresh tissue or tissue frozen at -20°C for as long as 2 wk. The mucosa was cut into frozen sections for histochemical demonstration of some enzymes; other enzymes were studied in homogenates derived from the mucosal tissue. The enzymes in the supernatants of the homogenates were separated by electrophoresis in acrylamide gel at different pH values. Some enzymes were identified by differential staining of the gel; these were unspecific esterases, LDH, alkaline phosphatase, and leucine aminopeptidase. These enzymes were identified in the sera of normal persons and the sera of persons with liver cirrhosis using the same means. In all parts of the gastrointestinal tract numerous water-soluble esterase fractions were found; these were a group moving anodally, some slowly and some rapidly. The esterases of normal serum did not coincide with any of the gastrointestinal esterases, at least with respect to their migration velocities. The LDH fractions I-V showed different, characteristic conc. in the various divisions and subdivisions of the tract. Contrary to results of histochemical tests, leucine aminopeptidase activity was found in homogenates of the mucosa of stomach and rectum; 3 anodally-moving leucine aminopeptidase fractions with different staining intensities were found in different parts of the gastrointestinal tract; 1 fraction from the mucosa coincided with 1 fraction from the serum. Alkaline phosphatases of the small intestine could be separated into 3 fractions in the jejunum; 1 fraction could be detected in all parts of the gastrointestinal tract; in addition to a normal serum phosphatase this fraction was found in the serum of patients with cirrhosis of the liver. This is the only enzyme analyzed and so far clearly identified in the serum.

7988 COMPLICATIONS IN PERITONEOSCOPY AND THEIR PROPHYLAXIS. (Rus.) Vasiliev, R. K. (Hosp. No. 1, Moscow). Sovet. Med. 30(2): 87-91, 1967.

A total of 642 cases of complications (including the author's) which occurred during the initial stages of peritoneoscopy (establishment of pneumoperitoneum) were found in Soviet and foreign literature. The following complications were found (number of cases in parentheses): subjective sensation of the patient, s.c. emphysema of the abdominal wall while treating pneumoperitoneum (137), acute development of ascites (62), mediastinal emphysema (48; 2 of which were fatal), emphysema of the greater omentum (38), puncture of the genital organs (26; 1 of which was fatal), large hematomas of the abdominal wall (28), collapse during establishment of pneumoperitoneum (20), air embolism (8; 6 of which were fatal), shock at peritoneoscopy (6), and 1 each of epileptic status at congenital epilepsy, emphysema of the intestinal wall, valvular pneumoperitoneum, strangulation of femoral and diaphragmatic hernia and puncture of bladder and hydronephrotic kidney. Prophylaxis of the complications is discussed. Complications (35) found while conducting peritoneoscopy (including the author's data) were internal hemorrhages (12), intestinal puncture, puncture of genital organs (7), infrequent torsion of the omentum about the peritoneoscope, strangulation of fatty intestinal suspension in the opening of the trocar membrane, and entrance of hernial content with puncture of the latter, introduction of optics into the hepatic parenchyma and prolapse of the omentum after removal of the trocar with optics. During 140 peritoneoscopies on patients (3-82 yr. old) with various surgical, therapeutic and gynecological diseases, emphysema of the abdominal wall was found in 5, emphysema of the greater omentum in 1 and hematoma of the abdominal wall with late suppuration (after 3 mo.) in 1. There were no fatal outcomes. Reasons for damage to mesenteric vessels, liver and omental vessels are discussed.

7989 STUDY OF THE METABOLISM OF TRYPTOPHAN IN VARIOUS HEPATO-DIGESTIVE DISEASES. II. FREQUENCE OF ANOMALIES IN NEOPLASTIC DISEASES. (Fr.) Lemonnnier, A. (St. Antoine Hosp., Paris), F. Lemonnier, B. Chevrel, C. Charpentier and J. Caroli. Rev. Franc. Etud. Clin. Biol. 12(2):162-169, 1967.

The metabolism of tryptophan was studied in 103 patients with 3 general types of disorders: 35 had cancer (11 pancreas, 11 liver, and 14 miscellaneous); 33 cirrhotics (17 alcoholic, 6 biliary cases and 2 with hemochromatosis); 35 h 1 of 7 different disorders of the digestive tra The metabolites of 5 g tryptophan p.o. were determined in the 24-hr. urine, chiefly by paper chromatography. Of the cases of cancer, 27 (77 showed an abnormal excretion unrelated to distribution of the neoplasms. Among the 33 with cirrhosis, 9 subjects (27.3%) had disturbed tryptophan metabolism. In the general group of 35, 9 (25.7%) had faulty excretion. The metabolites measured were kynurenine, and xanthurenic, cyanurenic and anthranilic acids; tryptophan metabolism was considered abnormal wh 1 or more of these was present in the urine in amounts above the normal range. The etiology and mechanisms of these alterations are uncertain. The B-group of vitamins, especially pyridoxal phosphate and riboflavin, may be involved, inasmuch as in a large proportion of ca with faulty tryptophan metabolism, there were deficiencies in 1 or both.

7990 EXTRAPERITONEAL TREATMENT OF ABDOMINAL ORGANS WITH SOAP AND WARM WATER IN EXPERIMENTAL PERITONITIS. (Rus.) Flat, K. L. (Altai Med. Inst., Barnaul, USSR). Eksp. Khir. Anest. 12(1):33-35, 1967.

A study was made on 60 dogs (20/series) which we divided into 3 groups according to the site of t perforation opening (which was 0.5 cm in diamete Group 1, perforation in the anterior wall of the antrum; Group 2, perforation in the medial portion of the jejunum; and Group 3, perforation in the cecum. At relaparotomy 24 hr. later, purulent peritonitis was found; the abdominal organs were treated extraperitoneally with soap and warm water, the intestinal opening was close streptomycin and penicillin in 25% novocain soln were admin. and the incision was closed. During the postsurgical period, all animals received a 20% soln. of camphor oil, streptomycin and penicillin. A fecal mass (25 g/kg body wt.) was introduced into the perforation in order to approach clinical experimental conditions. In Group 1, all dogs were cured by the soap treatment. Fever was less pronounced, the duration o fever was shorter (av. 4.37 days), wt. loss was less (av., 0.9 kg) and recovery occurred more quickly (av., 8.7 days) than in untreated contro In Group 2, in dogs treated with soap the wt. loss and intoxication were less, temperature returned to normal earlier, leukocytosis was less pronounced and was restored more quickly,

ecovery occurred 7.1 days earlier than in
rols. The clinical course of peritonitis
roup 2 animals was more favorable than in those
roup 1. In Group 3, after treatment with
hyperemia of abdominal organs was increased,
serous tegmentum became rose-colored and
nt, local leukocytosis, phagocytosis and
toneal resistance increased, and gastric and
stinal peristalsis was activated. The number
acteria was markedly decreased by soap
tment, and it is concluded that soap treatment
eritonitis should be included among the ac-
ed methods for the treatment of peritonitis.

SILICONE FLUID IN THE PREVENTION OF
INTESTINAL ADHESIONS. (E.) Frey, C. F.
Michigan Med. Ctr., Ann Arbor), C. Thorpe and
rody. Arch. Surg. (Chicago) 95(2):253-256,

gue-Dawley rats were divided into 3 control
ps and 3 groups which received silicone
tment; controls consisted of 1) those re-
ing celiotomy alone; 2) those receiving
otomy and silicone fluid with a viscosity of
350 and 1000 centistrokes; and 3) celiotomy
abrasion of the intestines with sandpaper.
the experimental group, animals received
iotomy, abrasion of the intestines and silicone
id having a viscosity of 20, 350 and 1000
tistrokes. Silicone fluid was used in an ef-
t to prevent development of intestinal adhes-
s. Group 1 of controls had no intestinal ad-
ions when examined at sacrifice. Groups 2 and
eveloped adhesions. All animals that received
icone fluid in the experimental group also
eloped adhesions. Adhesions in silicone-
ated animals were more vascular and thicker
n in controls. Granuloma formation was also
ed in the silicone-treated rats, but not in
trols.

92 ANASTOMOSES IN THE ALIMENTARY TRACT
USING A SERO-MUSCULAR TUBULAR CUFF
HNIC. (E.) Lindenmuth, W. W. (Yale U. Sch.
., New Haven, Conn.) and C. J. May. Ann.
g. 165(4):590-597, 1967.

oux-en-Y loop of jejunum was prepared in 12
s by excising the mucosa of the proximal seg-
t for a distance of 1.5-2 cm. The loop was
ught into the chest through an incision in
e diaphragm and anastomosed to the proximal
ansected esophagus, the distal esophagus having
en closed. Four traction sutures (000 chromic
tgut) were placed equidistant around the cir-
mference to guide approximation of the esophagus
the edge of the mucosa-submucosa within the
junal tube. The full thickness of the esophagus
s sutured to the jejunal mucosa and submucosa.
ch of the 4 guide sutures then approximated a
adrant of the circumference of the esophagus
jejunal mucosa-submucosa. Usually the muscle
yer of the jejunum was included in the sutures,
t serosa was avoided. The seromuscular flap
of jejunum was sutured to the external wall of the esophagus. Four dogs developed mesenteric thrombosis soon after operation and died; 1 died because of gangrene of the loop but the seromuscular cuff was viable and firmly attached to the esophagus; the anastomosis leaked in 1 animal in which there was early gangrene; the 4 who survived 2-4 mo. had no anastomotic strictures. Microscopically there was good healing between the esophageal and jejunal muscle layers with minimal scarring. Leakage and stenosis were not observed. In 27 patients, various types of procedure using the seromuscular tubelike cuff technic for anastomosis were tried, using cuffs of stomach, duodenum, and ileum in this easier and safer anastomosis: esophago-enterostomy, 10; pancreatic-cystojejunostomy (intra), 3; choledochojejunostomy (extra), 5; esophagogastrostomy, 1; ampullary jejunostomy, 1; duodenal stump closure, 7. Case histories are given of 6 patients who had complications related to the operation.

7993 DOUBLE-BLIND TREATMENT STUDY OF SHIGELLOSIS COMPARING AMPICILLIN, SULFADIAZINE, AND PLACEBO. (E.) Haltalin, K. C. (Southwestern Med. Sch., Dallas, Tex.), J. D. Nelson, R. Ring, III, M. Sladoje and L. V. Hinton. J. Pediat. 70(6):970-981, 1967.

Infants and children (52) hospitalized for shigellosis were admin. ampicillin, 100 mg/kg daily, sulfadiazine, 120 mg/kg daily, both p.o. A loading dose of one half the total daily dose was given for the initial dose; subsequent doses were admin. every 6 hr. for 5 days. Rectal swabs were made daily; in vitro susceptibility to ampicillin and sulfadiazine were determined by a plate dilution method on all Shigella isolates from each patient; SGOT determinations were made before and at the end of therapy in 46; routine complete blood counts and serum electrolyte determinations were done on admission and repeated as necessary. Of the 52, 18 received ampicillin, 18 sulfadiazine, 16 placebo. Bacteriological failure rates in patients treated with placebo and sulfadiazine were 75% and 39%, resp., compared with 6% in those receiving ampicillin. Clinical failure was observed in 56% of placebo patients, 39% of sulfadiazine patients, and none of the ampicillin patients. It is concluded that ampicillin is a safe and highly effective drug for the treatment of shigellosis.

7994 RECENT ADVANCES IN ABDOMINAL AORTOGRAPHY. (E.) Kanter, I. E. (Presbyterian Hosp., New York, N. Y.) and R. J. Fleming. Angiology 18(5):334-348, 1967.

7995 CLINICAL TRIAL OF CIBA 32 644-BA. 52 PATIENTS. (Fr.) Sankalé, M. (Fac. Med., Dakar, Senegal), P. Satgé, M. Larivière, M. Moulanier, A. Bourgeade, C. Ballereau and A. M. Sow. Sem. Ther. 43(5):309-315, 1967.

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7997 POST-THERAPEUTIC ANTIBIOTIC CONTENT OF FAECES. (E.) Bognár, S. (Laszlo Cent. Hosp., Budapest) and L. Binder. *Acta Microbiol. Acad. Sci. Hung.* 14(1):65-70, 1967.

7998 DETECTION OF THERMORESISTANT *Cl. perfringens* STRAINS, TYPE A, IN HUMAN FECES. (Rus.) Khazanova, V. V. and G. V. Medvedovskaia. *Zh. Mikrobiol.* 44(5):105-110, 1967.

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8000 THE INFLUENCE OF CHLORAMPHENICOL AND CORTICOTHERAPY ON THE EVOLUTION OF TYPHOID FEVER. (Rum.) Gavrilă, I. (Contagious Dis. Clin., Cluj, Rumania), A. Cucu and D. Cirstina. *Med. Intern. (Bucur.)* 19(4):403-408, 1967.

8001 GASTRIC AND ESOPHAGEAL HYPOTHERMIA IN THE TREATMENT OF MASSIVE HEMORRHAGES OF THE UPPER DIGESTIVE TRACT. (Sp.) Jadraque, L. M. (La Paz Clin., Madrid). *Medicamenta (Madr.)* 25(439):276-280, 1967.

8002 BISMUTH SUBNITRATE SUSPENDED IN POLYOSIDES FOR GASTRIC AND INTESTINAL DISEASES. (Fr.) Thénot, A. and J. P. Lecouturier. *Vie Med.* 48(T):585-588, 1967.

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8004 COMPARISON OF FURAZOLIDONE, OLETETRINE AND VITACYCLINE IN TREATMENT OF ACUTE BACTERIAL DYSENTERY. (Rus.) Urazaliev, I. U. (Tashkent Med. Inst., USSR). *Med. Zh. Uzbek.* (2):15-17, 1967.

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8012 TREATMENT OF ACUTE ULCERATIVE INTESTINAL AMEBIASIS WITH CLEFAMIDA. (Sp. Heiblum, M. *Prensa Med. Mex.* 32(1-2):59-60, 19

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8016 THYMOLAN AND THIABENDAZOLE IN HOOKWORM DISEASE. (E.) Salunkhe, D. S. (B. J. Med. Coll., Poona, India) and J. H. Balwani. *Indian J. Med. Sci.* 21(2):85-88, 1967.

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8021 STUDIES ON ANTIBIOTIC SENSITIVITY, BACTERIOPHAGE TYPES OF S. typhi AND S. paratyphi A STRAINS AND VI-AGGLUTINATION CONTENTS OF ENTERIC FEVER CASES. (E.) Belgaumkar, P. H. (Haffkine Inst., Bombay) and M. V. Sant. Indian J. Med. Res. 55(3):199-204, 1967.

8022 THE DIAGNOSIS OF CYSTIC TUMORS OF THE MESENTERY. (Rus.) Mishenda, N. P. (Chernovtsy Oncol. Hosp., USSR) and Z. M. Veshler. Klin. Med. (Moskva) 45(4):61-63, 1967.

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8024 CLINICAL TRIAL OF A NEW ANOREXIC AGENT: RD 354. (Fr.) Plauchu, M., J. Kofman and H. Chapuy. Lyon Med. 217(17):1247-1261, 1967.

See also abstract nos.: 7930,8356,8411

GASTROINTESTINAL DISEASES

GENERAL

8025 DIAGNOSIS OF ULCEROGENIC TUMOR OF THE PANCREAS BY BIOASSAY. (E.) Moore, F. T. (Ohio State U. Sch. Med., Columbus), J. E. Murat, G. L. Endahl, J. L. Baker and R. M. Zollinger. Amer. J. Surg. 113(6):735-737, 1967.

Adult male rats (Wistar strain), bearing a total gastric fistula, were used in the preoperative differential diagnosis of suspected ulcerogenic tumor of the pancreas. Ten of 139 patients (aged 30 to 67 yr., 7 men and 3 women) responded positively to such bioassay of the serum, gastric juice or urine for gastric acid secretagogue activity. The diagnosis was histologically confirmed in each case. Among 129 subjects who gave negative bioassay responses were: 45 cases of duodenal ulcer, 5 of gastric ulcer, 52 of marginal ulcer, 5 of enteritis, 3 of bronchial adenoma, 3 of post-shunt hepatic cirrhosis, 16 normals. Diagnoses were made after surgical exploration. The authors stress the reliability of the technic described as a bioassay for ulcerogenic pancreatic tumors.

8026 VARIABILITY OF GASTRIC SECRETION IN PATIENTS WITH AND WITHOUT THE ZOLLINGER-ELLISON SYNDROME. (E.) Winship, D. H. (Marquette U. Sch. Med., Milwaukee, Wis.) and E. H. Ellison. Lancet 1(7500):1128-1130, 1967.

Repeated histamine stimulation tests and 12-hr. (overnight) measurements of basal acid secretion were made in 8 patients with severe, recurrent peptic ulcers (a 14-yr.-old boy and 3 men, 4 women, aged 26-68 yr.). Results suggested the presence of Zollinger-Ellison syndrome in all cases, although this tentative diagnosis was confirmed histologically, at the time of surgery, in only 4 of 8 (including 1 of 8 in whom histamine stimulation could not be repeated, due to hemorrhage requiring emergency surgery; 1 of 8 in whom basal acid secretion studies had been positive but histamine stimulation studies had appeared to be negative). In all patients, gastric secretory patterns showed striking variations in terms of the absolute values which were tabulated at different times. This was especially marked in the case of basal acid secretion levels. Among the patients in whom the syndrome was confirmed, 3 of 4 had metastatic carcinoma of the pancreatic islet cells; 1 of 4 had microadenomatosis of the pancreatic islets. Among the patients in whom the syndrome was not confirmed, 1 of 4 was suffering from a large gastric ulcer; 3 of 4 had active duodenal ulcers. Note is made that the pancreatic tail was not resected for diagnostic purposes, in this last group of patients, so that the presence of the syndrome was not, in fact, completely excluded.

8027 ISLET CELL TUMOR OF THE PANCREAS WITH REVERSIBLE WATERY DIARRHEA AND ACHLORHYDRIA. (E.) Marks, I. N. (Groote Schuur Hosp., Capetown, South Africa), S. Bank and J. H. Louw. Gastroenterology 52(4):695-708, 1967.

A 34-yr.-old male with a metastasizing non-β-is cell tumor of the pancreas with intractable wat diarrhea (16-yr. duration), hypokalemic acidosi hypercalcemia, and achlorhydria is presented. Resection of the primary tumor induced a transi partial remission of the diarrhea and a return acid secretion, and steroid therapy (initially 300 mg hydrocortisone hemisuccinate daily; late decreasing doses of prednisone to 12.5 mg daily given during a subsequent relapse, resulted in dramatic cessation of the diarrhea and a striki increase in acid secretion. The pathological features of the above syndrome are virtually id tical with those of the Zollinger-Ellison syndr Gastrin-like substance could be demonstrated in the latter, not in the former. The Zollinger-Ellison syndrome is characterized by marked aci hypersecretion, intractable peptic ulceration, possible steatorrhea or diarrhea; the other syndrome by watery diarrhea, the effects of water and electrolyte loss, hypochlorhydria or achlorhydria. A large number of patients showe mixed features. In the above case the possibil exists that the islet cell tumor was responsibl for the severe attacks of intermittent diarrhea which started in 1955, and that the diarrhea became intractable only after metastatic spread had already occurred. It is concluded that thi syndrome is a specific entity distinct from the clinical variants of the gastrin-induced Zollin Ellison syndrome.

8028 HYPERCALCAEMIA AND GASTRIC HYPERSECRE IN THE FAMILIAL ENDOCRINE-ADENOMA SYNDROME. (E.) Kerr, G. D. (Waikato Hosp., New Zealand) and R. Smith. Lancet 1(7499):1074-107 1967.

Five hyperparathyroid patients in 3 generations of the same family with the multiple endocrine adenomatosis syndrome, i.e., with 1 or more endocrine adenomas, were studied to determine any possible relation between gastric hypersecr tion and hypercalcemia in 2 of the patients; these 2 sisters had gastric hypersecretion, wit subsequent total gastrectomy and parathyroidect The ages and sex of the 5 patients were: 54 (woman), 39 (woman), 36 (woman), 33 (man), and 14 (boy). Each of the 5 showed different featu of the familial syndrome. Laboratory studies included basal and stimulated gastric secretion (initial, after phosphate, and after parathyroi ectomy), plasma Ca, and P. It seemed that the biochemical and clinical manifestations of this familial disorder do not appear until after childhood. Parathyroidectomy did not significa reduce the hypersecretion in the patient in who this operation was done first.

8029 CYTOLOGY OF ISLET TUMOURS AND HYPER-PLASIAS ASSOCIATED WITH THE ZOLLINGER ELLISON SYNDROME. (E.) Cavallero, C. (U. Pavi Italy), E. Solcia and R. Sampietro. Gut 8(2): 172-177, 1967.

ourpose of this study of 6 cases was to
rtain a possible role for the argyrophil-
chromatic cell in the histogenesis of islet
tumors which form part of the Zollinger-
son syndrome together with gastric hypersecre-
and multiple recurrent peptic ulcerations.
opears that on properly fixed human islet
ue both argyrophilia with Davenport silver
egnation and toluidine blue metachromasia
characteristic staining reactions for the
rophil-metachromatic cells which are non-
lin nonglucagon-producing; no morphological
tionships appear to exist between the argyro-
cells of these tumors and the argentaffin
s of intestinal carcinoids. On histochemical
nds, it is suggested that both normal and
r argyrophil-metachromatic or argyrophil-
chromatic cells contain acid protein similar
hat in the antropyloric mucosa of the stomach;
ssible relation between this acid protein and
rin may exist.

PURIFICATION AND PARTIAL CHARACTERIZATION OF ENTEROTOXIN C PRODUCED BY
hylococcus aureus STRAIN 137. (E.) Borja,
. (U. Wisconsin, Madison) and M. S. Bergdoll.
hemistry (Wash.) 6(5):1467-1473, 1967.

rotoxin C, produced by Staphylococcus aureus
in 137, was purified by chromatography on a
cellulose column and gel filtration through
adex G-75 and G-50. The purified entero-
n had a high degree of homogeneity, as deter-
ed by electrophoresis and by synthetic boundary
eading; this was confirmed by estimation of
ity by the double-diffusion tube technic.
highly-purified toxin is a simple, colorless
antigenic protein with a sedimentation co-
icient of 3.0 S. Sedimentation and diffusion
surements disclosed a molecular wt. of approx.
000. The basic nature of the protein was
wn by its isoelectric point, which is 8.6 in
onal buffer of 0.1 ionic strength. The toxin
a marked degree of toxicity; 5 μg produced
sis in rhesus monkeys (2-3 kg) within 2-5 hr.
er its intragastric admin. Symptoms of food
soning were noted in 7 of 9 animals that
eived the toxin (0.5 μg/animal) by i.v. inj.
pactness of the enterotoxin molecule was sug-
ted from data on intrinsic viscosity, axial
io and frictional ratio.

31 EXPERIMENTAL ALLERGIC ENTEROCOLITIS.
(Rus.) Nogaller, A. M. (Astrakhan
I. Inst., USSR) and G. A. Trubnikov. Biull.
sp. Biol. Med. 63(2):38-41, 1967.

periments were performed on 25 dogs, of which
were controls (5 received only Freund's
juvant and 5 received intestinal antigen without
e adjuvant). Antigen for immunization was
epared in the following manner: mucous membrane
canine large intestine was washed with sterile
ysiological soln., ground down with quartz
nd, diluted with physiological soln. in the
ratio of 1:1 or 1:2 and centrifuged for 30 min. at 5000 revolutions/min.; the supernatant was removed, merthiolate added and mixed with Freund's adjuvant in the ratio of 1:2. The dogs were immunized s.c. twice (with a 7-day interval) with this mixture of intestinal antigen and Freund's adjuvant (3 ml/admin.), and they were observed for 1-6 mo. Approx. 10 days after the final inj. there was an exacerbation of appetite and vomiting, which included mucus and blood; RBC and WBC appeared in the feces, and there was inflammatory intestinal hypersecretion. The content of enterokinase and alkaline phosphatase in the feces increased 8-10-fold and erosive-catarrhal colitis was evident. A progressive enterocolitis with increasing cachexia in 3 animals resulted in death 1 mo. after admin. of the antigen; in 6 animals enterocolitis disappeared and they were cured after 2-3 mo. In the other 6 dogs acute colitis was less pronounced and they were cured after 1-1.5 mo. No pathological conditions appeared in control animals. The Coomb's and Steffen's reactions were negative during the first wk. after the end of immunization; they were slightly positive by the second wk. and strongly positive after 3 or more wk. Animals which died or were sacrificed at the peak of enterocolitis displayed marked hyperemia of the mucous membrane of the large intestine, the distal part of which had multiple erosions and ulcers. Small intestinal mucous membrane displayed individual sections of hyperemia, edema and hemorrhage and histological examination revealed a pronounced picture of inflammation. In animals sacrificed after 4-6 mo. of observation, and in all controls, there were no signs of inflammation in the large or small intestine. Thus, models of allergic enterocolitis can be made by isoimmunization with large intestine mucous membrane tissue; this can serve as an indirect proof of the autoallergic theory of pathogenesis of nonspecific ulcerative colitis in man.

8032 VIRULENCE AND TOXICITY OF ENTEROPATHOGENIC INTESTINAL BACTERIA IN ADRENALECTOMIZED ANIMALS. (Rus.) Krivonosova, R. T. (Leningrad Med. Inst., USSR). Biull. Eksp. Biol. Med. 63(2):45-46, 1967.

Albino mice (approx. 1000; 1.5-2.0 mo. old; 16-18 g body wt.) were bilaterally adrenalectomized and infected 6 days later with 12 strains of enteropathogenic Escherichia coli $0_{55}:B_5$; some received phagolysate 48 hr., 6 and 12 days after adrenalectomy. The LD_{50} of all strains of bacteria for adrenalectomized mice fluctuated between 5-16 x 10^6 bacteria, while that for controls (not adrenalectomized) ranged between 50-1500 x 10^6 cells. The sensitivity of adrenalectomized mice to infection by these cultures increased from 6-300 fold. The toxicity of all microorganisms of these cultures was similar, but the ability of the bacteria to multiply in the organism varied considerably. Thus, intact animals were more suitable to determine the comparative virulence of the cultures, while adrenalectomized animals were better for demonstrating slight differences in toxicity. For controls, the LD_{50} of enteropathogenic E. coli phagolysate exceeded 1 ml; in adrenalectomized mice the LD_{50} was 0.18 ml 48 hr. postoperatively, 0.22 ml 6 days postoperatively and 0.4 ml 12 days postoperatively. Thus, in order to determine toxicity of phagolysate, the most suitable time for study was 2-6 days after adrenalectomy; however, their increased sensitivity was preserved to almost the same degree at later periods. A similar study using older mice (approx. 2 yr. old; 30-32 g body wt.) yielded similar results. Thus, age had no critical importance in determining the residual toxicity of phagolysates.

8033 LONG-TERM RESULTS OF CHEMOTHERAPY OF OPERABLE CANCER OF THE GASTROINTESTINAL TRACT.

(E.) Blixenkrone-Møller, N. (U. Aarhus, Denmark). Acta Chir. Scand. 133(2):157-159, 1967.

The following drugs were used: chlormethine N-oxide in 2 courses, each of 600-700 mg; cyclophosphamide in 1 course of 4000 mg. During the first 2 yr. of the period of the study (1957-1961), the former drug was used, after that the latter. The subjects were: cancer of the colon, 48 received chemotherapy, 48 did not; cancer of the rectum, 57 with, 87 without; cancer of the stomach, 23 with, 23 without. In the colon group, survivals for those with and without chemotherapy, resp., were: after 5 yr., 65% and 56%; after 8 yr., 61% and 42%. In both groups 70% of the deaths were due to cancer. The differences in survival times between the 2 subgroups were statistically significant. No differences were demonstrable in either the rectum group or stomach group. Studies with a longer regimen of therapy are suggested.

8034 GROWTH HORMONE CONCENTRATION IN TUMOR PATIENTS.

(Rus.) Gazetov, B. M. (All-Union Res. Inst. Clin. Exp. Endocrinol., Moscow) and M. I. Balabolkin. Vop. Onkol. 12(12): 30-34, 1966.

In 40 patients (23 men, 17 women; 30-70 yr. old) with various tumors (located in the stomach in 17, rectum in 11, large intestine and recurrent gastric tumors-3 each, kidneys, 2 each, and 1 each in the pancreas, thyroid gland, liver, ovaries and papilla of Vater), the av. conc. of growth hormone was 31.2 µg%, compared to a level of 17.4 µg% in 35 essentially normal controls. In the tumor patients the level of growth hormone was independent of age, sex, or duration and stage of the disease. No sex differences in the level of the hormone were found among the healthy controls. Growth hormone level was highest in the liver (38.4 µg%) and stomach (35.5 µg%); in the thyroid gland, papilla of Vater, recurrent gastric tumors, large intestine, rectum and kidney it av. 24.7-32.0 µg%, and was lowest in the pancreas and ovaries (20.0 µg%). The highest level of growth hormone was found in mucous and primary liver cancer (38.4 µg%), while it ranged from 26.0 µg%-31.9 µg% in adenocarcinoma, hypernephroid and primary liver cancer and was lowest in squamous cell cancer (18 µg%). In a study of 20 patients, after radical removal of the tumo (i.e., Stages 1 and 2 of the disease) and lymp nodes, the growth hormone level decreased to normal values 2 wk. after surgery; however, af nonradical or palliative surgery (Stages 3 and of the disease), the level of growth hormone i creased, evidently in parallel with tumor deve ment.

8035 DETECTION OF COMMON CANCER ANTIGEN I TUMORS OF DIFFERENT LOCALIZATION AND HISTOLOGICAL STRUCTURE.

(Rus.) Rogalskii, V. (Gertzen State Oncol. Inst., Moscow). Biull. Eksp. Biol. Med. 63(3):110-112, 1967.

The semimicro modification, according to A. I. Gusev and V. S. Tsvetkov, of the agar precipit tion reaction, and monospecific antitumor sera against human large intestinal tumor tissue, o tained by immunization of rabbits with water-s extracts from tumor tissue of 7-8 individuals, were used in this study. Only extracts from tumor cells were used after absorption of immu sera by normal antigens of serum, kidney, sple lung, liver and normal mucous membrane of the large intestine. Specific cancer antigens wer found in 12 of 51 tumors. Tumors containing such an antigen were localized in the stomach, lungs, esophagus and thyroid gland, and histological structure of the tumors included squam cell cancer, adenocarcinoma, solid and microcellular cancer. All of the tumors contained identical cancer antigen. In a study of extra from human embryonal tissues (twelve 6-8-wk.-o embryos), this antigen was not detected, and i is concluded that the antigen is not embryonic It is the author's opinion that this study ver fies the hypothesis that several immunological separated groups of specific tumor antigens ex it is possible that a group of specific antige is related to a group of etiological factors w together cause malignancy.

8036 THE GASTROINTESTINAL TRACT. AN OFTE FORGOTTEN SOURCE OF PROLONGED FEVER.

(E.) Rakatansky, H. (U. Chicago, Ill.) and J. Kirsner. Arch. Intern. Med. (Chicago) 119(4): 321-328, 1967.

Diseases of the gastrointestinal tract may oft have fever as a primary manifestation. Specif infectious agents include Salmonella, the viru of infectious and serum hepatitis, tuberculosi pyogenic bacteria involving the liver, and occasionally the lung as a result of esophageal reflux in achalasia, and, rarely, parasitic in festations. Nonspecific inflammations with fe as a primary feature include cirrhosis of the liver, regional enteritis, and rarely, ulcerat colitis. Neoplasms of the gastrointestinal tr also may manifest initially as obscure fever, especially Hodgkin's disease and tumors of lymphoid tissue. The examination of patients "obscure" fever should include complete uation of the gastrointestinal tract. Analysis he records of 30 unselected patients hospital- at Billings Hospital with a discharge diag- s of fever of unknown origin and all of whom documented fever for at least 1 wk., revealed only 12 had complete X-ray examination of gastrointestinal tract, including examinations he gallbladder, esophagus, stomach, duodenum, n, and in some cases, the small intestine; ad no gastrointestinal examinations, and 6 incomplete studies. Five case histories are n in some detail.

7 ROENTGENOLOGIC STUDIES OF THE ALIMENTARY TRACT IN KWASHIORKOR. (E.)

Kowalski, R. sp. Gabriel Toure Bamako, Republic of Mali). . J. Roentgen. 100(1):100-112, 1967.

in roentgenologic studies of the abdomen were e of 79 African children with various degrees kwashiorkor, ranging from extremely severe different stages of the disease, including trecovery examination (58 children), to in- ient and mild forms (19 cases), and the dry e., non-edematous) form (2 cases). Barium fate roentgenograms were made at 15-, 30-, 45-, 60-min. intervals, and fluoroscopic examina- ns were made of peristalsis. Ba enemas also e used. The presence of fluid levels in the ll intestine was demonstrated. The principal ntgenologic signs of kwashiorkor are based motor function disturbances. Findings were nd to depend on severity and duration of the ease. The 77 severe and mild cases showed ked damage of motor function of the entire mentary tract, especially the propulsive tor but, the ring construction was pronounced. one case, motor function was still impaired yr. after onset of the disease. Impairment found to occur anywhere from the esophagous the colon. Hypertonicity of the entire tract too appreciable to be due to anxiety.

38 USE OF $^{51}CrCl_3$ IN THE DIAGNOSIS OF PROTEIN-LOSING ENTEROPATHY. (E.)

lker-Smith, J. A. (Royal Prince Alfred Hosp., dney, Australia), A. P. Skyring and S. P. stillis. Gut 8(2):166-168, 1967.

llowing i.v. inj. of radioactive chromic chloride saline (100-200 µc, single dose), blood samples re taken at 5 min. and then every second day for days. Total fecal and urinary radioactivity re also measured in 5-day samples. Binding to rum proteins appeared to be virtually instan- neous and was also exceptionally tight. Among control patients without excessive enteric otein loss, 5-day fecal radioactivity ranged om 0.1-1.0% of the total inj. dose (mean = 0.5%). ong 5 of 6 patients with ulcers, it ranged from .8-16.5%; in the sixth, in whom ulcerative lesions re limited to the rectosigmoid region, it was .0%. Among 8 of 9 patients with adult celiac sease, it ranged from 1.2-7.4%, including 5 of 9 with subtotal villous atrophy (range = 1.1-7.4%; mean = 4.1%) and 3 of 9 with partial villous atrophy (range = 1.2-3.0%; mean = 1.83%). Increased fecal radioactivity was also found in 5 other patients, suffering from alcoholism (1.8%), idiopathic hypogammaglobulinemia (1.9%), lymphangiectasia (2.0%), dermatomyositis (4.5%) and melanomatosis of the small intestine (17.5%). Normal-range values (0.5% and 0.7%, resp.) were seen in patients with acute constrictive pericarditis and nephrotic syndrome. There was a statistically significant, direct relationship between the degree of hypoalbuminemia manifested and the amount of stool radioactivity. Levels of urinary radioactivity were substantially the same in the patient and control groups. The mean half-life of the inj. in controls was 9.2 days (range = 5.0-13.7 days); in patients with fecal radioactivity exceeding 1.0%, it was 5.6 days (range = 2.8-9.4 days). It is concluded that the *in vivo* labeling of serum proteins is a simple and effective technic for demonstrating enteric protein loss, although the method does not permit concurrent estimation of the daily turnover of albumin.

8039 SKIN REACTIVITY IN PATIENTS WITH CHRONIC DISEASES OF DIGESTIVE ORGANS. (Rus.)

Burykina, G. N. (Leningrad Sanit.-Hyg. Med. Inst., USSR). Vestn. Derm. Vener. (11):10-15, 1966.

Skin reactivity was studied in 3 groups of patients: Group 1, 31 patients with chronic diseases of the stomach and liver (chronic gastritis and hepatitis of 2-15 yr. duration); Group 2, 28 patients with nonspecific ulcerative colitis; and Group 3, 12 patients with chronic spastic colitis. All of the latter had disturbances of intestinal function and many had chronic gastritis with decreased secretory function of 5 mo.-15 yr. duration. Skin diseases were found in 22 of 71 (pruritus in 10; recurrent urticaria and drug toxicodermia in 4; seborrhea in 4, and other dermatoses in 4). In more than 50% of the patients of Group 2 and in 8 patients of Group 1, skin sensitivity toward electric current was increased, while 14 (mostly with liver cirrhosis) showed a marked decrease in such sensitivity. Sensitivity toward heat and cold was decreased 3-4-fold in nearly all of the patients compared to healthy controls. Skin sensitivity toward cold in the abdominal region was decreased 8-9-fold in Group 2 patients. Sensitivity to pain was also markedly decreased in all of the patients. Differentiated responsive vascular reaction on chemical transmitters of neural impulses to histamine and serotonin were absent in almost all of the patients in Groups 1 and 3, while 15 patients from Group 2 had pronounced spastic reactions to epinephrine which exceeded the normal reaction by 2.3 times. There was increased capillary permeability in 66% of the patients in Group 2 and in 33% of those in Group 1. The functional changes of the vessel were spasmogenic. A repeated study 1.0-1.5 mo. after treatment in 11 patients from Group 2 revealed that skin sensitivity had approached normality; however, the changes of vascular function were more stable. It is suggested that during the examination of patients with dermatoses and institution of general therapy, special attention should be directed to the general condition of the digestive organs, and if possible, intestinal autointoxication should be eliminated.

8040 FUNCTIONAL STATUS OF THE SKIN AND THE DIGESTIVE ORGANS SYSTEM IN THE PATHOGENESIS OF SOME DERMATOSES. (Rus.) Gorbovitskii, S. E. (Leningrad Sanit.-Hyg. Med. Inst., USSR), A. D. Troitskaia, E. I. Arkhangelskaia, G. N. Burykina, G. A. Ustinova and K. Y. Mikhalevskaia. Vestn. Derm. Vener. (11):3-10, 1966.

Pathologic changes of the digestive organs were found in 205 of 256 patients with eczema (103 anacidic, 26 hyperacidic, 71 hypoacidic-gastritis and 3 duodenal ulcer), 33 of 35 patients with epidermophytosis with allergic rash, 50 of 75 patients with erythrodermia and in 60 patients with drug toxicodermia (intestinal dyskinesia, chronic colitis and adhesive disease); such changes were less frequent in 25 patients with psoriasis and 25 patients with lichen ruber planus. Liver detoxification was markedly depressed in 101 patients, and moderately depressed in 85, of 294 patients with eczema, in 55 and 9, resp., of 75 patients with erythrodermia, and in 15 and 16, resp., of 60 patients with drug toxicodermia; 16 of 35 patients with epidermophytosis showed marked depression of this function. Liver carbohydrate function was pathologic in 62 of 104 patients with eczema, in 57 of 65 patients with erythrodermia and 41 of 60 patients with drug toxicodermia. Most of the patients with eczema showed disturbances of the functional condition of the cutaneous receptors and higher neural centers. Sensory chronaxie was prolonged; the vascular reactions of the skin to epinephrine, acetylcholine and histamine were either marked (37%), undifferentiated and distorted (27%) or low (13%), reflex reactions to cold stimuli markedly exceeded in force and duration the reaction to heat, and were more pronounced in patients than in healthy controls, and sensitivity of skin receptors to electric current was increased at the site of lesions and decreased in normal regions. The tactile sensitivity of the skin in areas of lesions was markedly decreased in 90% of the patients and remained unchanged on healthy skin. Sensitivity of the skin to facultative chemical stimuli was markedly increased in 42% of the patients with eczema, and became normalized during recovery. Changes of skin reactivity in patients with epidermophytosis were similar to those observed in eczema patients. Erythrodermia patients showed a strong reaction to epinephrine and none to acetylcholine and histamine. In patients with toxicodermia and erythrodermia, during the acute period, capillary fragility and vascular permeability were increased, and hemodynamic disturbances of a spastic-atonic nature were present; during the period of clinical cure tonus of the blood vessels was normalized in 4 of 60. In patients with psoriasis the sensiti to electric current was increased in the lesion and the perifocal zone, while tactile sensitivi was increased in the perifocal zone and healthy skin and markedly reduced in the lesions; the reaction to epinephrine and histamine was more pronounced in the patients than in the healthy controls. During the period of recovery all persons tested returned to normal. In patients with lichen ruber planus, the rheobase was shortened, sensorial chronaxia was prolonged, tactile sensitivity was decreased and the react to histamine was marked; reaction to acetylchol and epinephrine was the same as in healthy controls. In contrast to patients with eczema and psoriasis, healthy skin in all of the patients with lichen ruber planus exhibited normal physiological indices. In the authors' opinion this relationship between cutaneous disorders and digestive disease is definite and constant.

8041 SJÖGREN'S SYNDROME. ITS ROENTGENOGRA FEATURES. (E.) Silbiger, M. L. (NIH Bethesda, Md.) and C. C. Peterson, Jr. Amer. J Roentgen. 100(3):554-558, 1967.

A review of all available X-rays of 42 patients with confirmed Sjögren's syndrome (40 women, 2 men; aged 25-73; 2 of 40 with concurrent scleroderma, 3 of 40 with reticulum cell sarcom confirmed the presence of concurrent rheumatoid arthritis of the hands and wrists (13 of 36 for whom appropriate films were available), ankles and feet (12 of 36), knee (8 of 36) and shoulde (4 of 17). Comparable tabulations for destruct juxta-articular changes were 5 of 36, 4 of 36, 0 of 36 and 1 of 17, resp.; for osteoarthritis, 1 of 36, 0 of 36, 2 of 36, and 1 of 17, resp. Also found were 1 case each of vascular calcifi tion of the feet and ankles, chondrocalcinosis of the knee. Four of 5 X-rays of the temporomandibular joint showed rheumatoid arthritic changes. Of 37 X-rays of the cervical spine, 9 showed osteoporosis; 8, abnormal atlantoaxial separation; 2, apophyseal joint destruction; 6, osteoarthritis. Of 35 X-rays of the thoracic spine, 18 showed osteoporosis; 5, osteoarthriti Of 35 X-rays of the lumbar spine, 16 showed osteoporosis; 4, osteoarthritis. Of 36 X-rays of the pelvis and sacroiliac, 12 showed osteoporosis; 5, sacroiliitis; 5, rheumatoid arthrit of the hip. Of 42 X-rays of the chest, 14 showe reticular-nodular infiltration; 4, patchy infiltration; 1, hilar lymph node enlargement; 1, bronchiectasis. Ductal and/or alveolar ectasia appeared in 31 of 33; osteoporosis of the skull, in 2 of 17; sinusitis, in 1 of 12; hepato- or splenomegaly, in 7 of 22. Twenty-five X-rays of the upper gastrointestinal tract showed 1 case each of gastric ulcer, duodenal ulcer and reticulum cell sarcoma of the stomach. Lymphadenopathy was found in 3 of 5 patients undergoi lymphography; nephrocalcinosis, secondary to renal tubular acidosis, in 1 of 13 in whom the renal structures were visualized. It is conclu

this disorder represents a complex, general-
systemic disease process in which much
emphasis needs to be placed on destructive
and joint changes, chest infiltration and
ccasional occurrence of abnormal lymphographic
erns and/or nephrocalcinosis.

AUTOPSY INCIDENCE OF DISEASES AMONG
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utopsy study of 328 American Indians (78% of
h came from the Pima, Apache and Papago
es) from southwestern tribes, representing
ox. 20% of all southwestern Indian deaths over
yr. period showed that there was no decrease
he incidence of cancer (53 of 328 or 16.2%)
g this group. The gallbladder and biliary
was the most frequent primary site of
gnancy and its incidence (13 cases) was more
6 times that of the general population.
inoma of the stomach, colon and lung fell
w the incidence expected in the general popula-
. The incidence of cholelithiasis among
hwestern Indians (29.9%) in both males and
les was almost twice that of the white popula-
. The prominence of diabetes mellitus (18.3%),
enital malformations, active tuberculosis
%) and portal cirrhosis (12.8%) in these
hwestern Indians suggests that there are
tic, socioeconomic and environmental factors
his population which differ from those of
general population.

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8111 AUTOIMMUNITY IN Schistosomiasis japon (E.) Kurata, M. (Kurume U. Sch. Med Japan). Kurume Med. J. 13(4):177-192, 1966.

8112 ATTEMPTS TO PRODUCE EXPERIMENTAL INTESTINAL CRYPTOCOCCOSIS AND SPOROTRICHOSIS. (E.) Sethi, K. K. (Jewish Hosp., Cincinnati, Ohio). Mycopathologia 31(3-4): 245-250, 1967.

8113 THE LOCALIZATION OF THE HERRING WORM Anisakis marina IN- AND OUTSIDE THE HUMAN GASTROINTESTINAL WALL. (WITH A DESCRIPTI OF THE CHARACTERISTICS OF ITS LARVAL AND JUVENI STAGES). (E.) Van Thiel, P. H. (U. Hosp., Leiden, Netherlands) and H. Van Houten. Trop. Geogr. Med. 19(1):56-62, 1967.

8114 HOOKWORM INFECTION AND INTESTINAL BLOOD LOSS. (E.) Martinez-Torres, C (U. Hosp., Caracas), A. Ojeda, M. Roche and M. Layrisse. Trans. Roy. Soc. Trop. Med. Hyg. 61(3):373-383, 1967.

8115 THE ISOLATION OF ENTEROVIRUSES AND ADENOVIRUSES IN DIARRHEAL DISEASES OF CHILDREN. (Cz.) Démant, F. (Safarika U., Kosice, Czechoslovakia), J. Hlaučová, M. Tarab J. Virgala and O. Vžentková. Bratisl. Lek. Lis 47(9):562-569, 1967.

See also abstract no.: 8247

ANATOMIC ETIOLOGY AND OPERATIVE TREAT-
MENT OF PEPTIC ESOPHAGITIS: AN
IMENTAL STUDY. (E.) Bombeck, C. T. (U.
ngton Sch. Med., Seattle), T. Aoki and L. M.
. Ann. Surg. 165(5):752-764, 1967.

ost important barrier to gastroesophageal
x is the lower esophageal sphincter, whose
tence may be lost by intrinsic destruction
s musculature or extrinsic distraction of its
by tension directed through the phreno-
ageal ligament. Conventional Allison
r and its modifications are effective in
ing hiatal herniation and in preventing
x due to extrinsic distraction of the
cter, but these measures are inadequate to
nt reflux due to intrinsic failure of the
cter. The only adequate operative procedure
ch cases is one that can support or replace
cter function under conditions of both
nsic failure and extrinsic distraction;
loplasty meets these criteria. The Nissen
plication was tested against experimental
s of reflux (in dogs) due to both causes.
s 100% effective in preventing reflux when
mained intact. Short-term drawbacks of this
dure included inability to vomit in a
ificant number of animals evaluated (5 of 12,
2%), and failure of valvuloplasty in one dog
in 2 mo. of operation due to separation at
suture line. From these studies it is
ested that hiatal hernia, which is due to a
xation of the phrenoesophageal ligament
wing the stomach to slide into the thorax,
acid-peptic reflux, which is due to failure
he lower esophageal sphincter, are 2 separate
distinct entities which may or may not occur
ther. Successful repair of a hernia must be
idered separately from successful alleviation
eflux, and any procedure that maintains
ial reduction while permitting reflux to
inue should be considered a failure.

7 QUANTITATION OF LOWER ESOPHAGEAL
SPHINCTER COMPETENCE. (E.) Winans,
. (U. Hosp., Boston, Mass.) and L. D. Harris.
roenterology 52(5):773-778, 1967.

ients were divided in 2 groups: Group 1, 14
mals (21-81 yr., av. 30) upon whom 80 measure-
ts of lower esophageal sphincter pressure
e made; Group 2, 7 patients, with grossly
mpetent sphincters as indicated by free
troesophageal reflux of Ba (24-86 yr., av. 50,
selected for absence of hiatal hernia), on
m 33 measurements were made. Pressures were
nsmitted by water-filled polyvinyl tubes
ternal diameter 1.4 mm). One tube was
nected directly to a transducer and was
ical of systems used in previous studies of
s sphincter (A). The other system (B) was
ified by placing between tube and transducer
idearm through which water was continually
used by a pump at 6-8 μliter/sec. Each tube
had a 1.2 mm lateral recording orifice, and the tubes were assembled so that pressures were recorded at points 5 cm apart. All manometric studies were performed with subjects supine. Belt pneumographs around the chest and larynx monitored respiration and swallowing, resp. Pressures were recorded as assembly was withdrawn by 1-cm increments from stomach to esophagus. Pressures obtained with the conventional system (A) could not differentiate between Groups 1 and 2; pressures recorded by System B from the same sphincters allowed a clear separation between Groups 1 and 2. Reproducibility of max. sphincter pressure in System B was evaluated by serial measurements from the same normal subject on 50 occasions over 6 mo. Although these pressures varied over a range of 20-35 mm Hg, they were in every instance clearly higher than pressure recorded by the same method from an incompetent sphincter. It is suggested that the failure of the conventional method was due to sealing of the recording orifice by the sphincter; this was eliminated by constant infusion of water.

8118 TRANSITION FROM SYMPTOMATIC DIFFUSE SPASM TO CARDIOSPASM. (E.) Kramer, P. (Boston U. Med. Ctr., Mass.), L. D. Harris and R. M. Donaldson, Jr. Gut 8(2):115-119, 1967.

A patient, 70 yr. old, presented with clinical symptoms of dysphagia, odynophagia, and lower retrosternal pain which worsened progressively over a period of 8 yr. The esophageal radiographic findings after a Ba swallow showed localized, segmental contractions, minimal dilatation and slight emptying; balloon-kymography and response to methachoeine were of little value in differential diagnosis; the manometric records were consistent with the diagnosis of diffuse spasm. The patient's clinical picture changed to one of cardiospasm 8 yr. after the first symptoms of diffuse spasm were experienced, as it appears from clinical and laboratory findings: substernal pressure on eating, relieved by washing his food through with water, and regurgitation. Esophageal radiographic findings showed an absence of peristalsis on swallowing, presence of a narrowed tapered area. Excellent relief symptoms were achieved by a forceful dilatation. Balloon-kymography and manometry also supported the diagnosis of cardiospasm.

8119 THE SIGNIFICANCE OF AN INTRA-ABDOMINAL SEGMENT OF CANINE ESOPHAGUS AS A COMPETENT ANTIREFLUX MECHANISM. (E.) Sicular, A. (Mt. Sinai Hosp., New York, N. Y.), B. Cohen, A. Zimmerman and A. E. Kark. Surgery 61(5): 784-790, 1967.

A sufficiently long segment of intra-abdominal esophagus functions as a competent barrier to reflux of gastric contents into the esophagus, the result of the forces exerted by intra-abdominal pressure on the collapsible subdiaphragmatic esophageal segment. This was determined by studies of the esophagus and the esophagogastric junction in the unanesthesized dog by means of observations on Ba swallow, by cineradiography and intraluminal pressure. As a result of these studies it is indicated that, clinically, when reflux occurs as a result of hiatus hernia and where manometric studies show poor or absent sphincter function, surgical construction of an infradiaphragmatic segment of esophagus of sufficient length would appear to be necessary for adequate restoration of normal function.

8120 CORRELATION OF ELECTRIC SURFACE POTENTIALS, INTRALUMINAL PRESSURES, AND NATURE OF TISSUE IN THE GASTROESOPHAGEAL JUNCTION OF MAN.

(E.) Meckeler, K. J. H. (Boston U. Sch. Med., Mass.) and F. J. Ingelfinger. Gastroenterology 52(6):966-971, 1967.

Since intraluminal gastric potential is usually negative with respect to skin, and esophageal potential positive, the site of max. potential change, determined on withdrawing an electrode from the stomach to the esophagus, has been used to identify the gastroesophageal mucosal junction. In order to ascertain if this practice is valid in man, simultaneous mucosal biopsies were taken proximal and just distal to the point where max. change in potential difference was recorded on withdrawing an electrode from stomach to esophagus. Simultaneous measurements of intraluminal gastroesophageal pressures were carried out. The test subjects included 15 men and 7 women, 34-77 yr. old, all of whom were capable of secreting gastric juice with a pH of less than 3.5. Fourteen had no known gastrointestinal disorders, 5 had peptic ulcer disease, 1 had a partial gastrectomy without vagotomy and 2 had hiatal hernia. In 18 of 22 subjects in whom a clearly defined change in potential difference could be recorded, the end point of max. potential difference change correlated 12 times with the presence of stratified squamous epithelium, and 6 times with junctional columnar epithelium devoid of parietal cells. From the other biopsy site, 25 mm distal, gastric mucosa with parietal cells was consistently obtained. Changes in potential difference began shortly before, or coincident with, the junctional zone of increased intraluminal pressure, whenever this could be identified. Changes in potential difference appeared to correlate better with the presence or absence of parietal cells than with the actual junction of columnar gastric and squamous esophageal epithelium. However, since parietal cell-containing gastric epithelium and squamous epithelium were not widely separated in most cases, changes in potential difference identified the location of the mucosal gastroesophageal junction accurately in 2 of 3 cases.

8121 BENIGN STRICTURE OF THE ESOPHAGUS SECONDARY TO GASTROESOPHAGEAL REFLUX.

(E.) Paulson, D. L. (Baylor U. Med. Ctr., Dallas, Tex.). Ann. Surg. 165(5):765-779, 196

A report is presented of 56 patients (approx. equal sex incidence; 4-84 yr. old) with benign stricture of the esophagus secondary to gastro esophageal reflux; 26 were longitudinal stenoses and 30 annular strictures. Of those with longitudinal stenosis, 70% were older tha 60 and 30% older than 70; patients with annula strictures were younger, only 30% being older than 60 and 15% beyond age 70. A previous history of gastroesophageal reflux, heartburn, regurgitation, substernal pain and suprasterna discomfort with choking was obtained from all patients with longitudinal or ascending stenos and from 27 of 30 with annular strictures. Diagnosis of esophageal stricture was made by radiological studies of the esophagus, includi cinefluorography. Treatment in all 26 patient with longitudinal stenosis consisted of transthoracic gastrotomy, retrograde dilatation and repair of the hiatal hernia in 11; resection a colon interposition, vagotomy and pyloroplasty in 10; cardiomyotomy, esophagoplasty and repai of the hiatal hernia in 2; endoscopic dilatati only in 2; and gastrostomy only in 1. Of 30 with annular strictures, 21 were treated by transthoracic gastrotomy, resection of the stricture at the submucosal level, suture of t mucosa and repair of the associated hiatal hernia; 5 had gastrotomy, dilatation and herni repair, 1 endoscopic dilatation and hernia rep 2 endoscopic removal of the foreign body only, and no operation in the remaining patient. There was 1 death in 55 patients. Results of surgery for annular strictures in 26 treated b either excision or dilatation with repair of t hiatal hernia were satisfactory if an adequate lumen was provided and gastroesophageal reflux corrected; dysphagia and symptoms of significa reflux were relieved in 18 of 23 patients followed for periods of up to 5 yr. Objective postoperative cinefluography of the esophagus 19 patients showed no reflux in 14 (75%) and, reflux in 5. Results of gastrotomy, dilatatio and repair of hernias for longitudinal stensos in 11 patients were immediately satisfactory, but repeated postoperative endoscopic dilatations were necessary in several. In 10 patients in whom resection, colon interpositio vagotomy and pyloroplasty were done, there was satisfactory relief from dysphagia; however, there were a few disturbances in motility and passage of food through the interposed colon. One patient had late bleeding, apparently from ulceration at the cologastric junction. It is concluded that benign strictures of the esophagus of either the ascending or annular types arise as a result of reflux esophagitis, culminating in chronic inflammation, ulceratio of the mucosa and submucosal fibrosis.

8122 SURGICAL CONSIDERATIONS IN THE MANAGEMENT OF ACHALASIA OF THE ESOPHAGUS.

(E.) Sawyers, J. L. (Vanderbilt U. Sch. Med.,

ville, Tenn.) and J. H. Foster. Ann. Surg.
5):780-785, 1967.

tal of 73 patients (19-85 yr. old; av. age
were treated for achalasia of the esophagus.
hagia had been present in 97% of the patients;
complained of regurgitation and wt. loss was
ificant in 67% (av. wt. loss was 29 pounds,
1 patient had lost 94 pounds). Pain was an
equent initial symptom, occurring in only 13
ents (18%). The av. duration of symptoms was
yr. before initiation of treatment.
hageal dilatation was performed in 64
ents; 21 (33%) were failures and required
equent surgical procedures; 44% had a good
lt from dilatation, 11% had fair results and
had poor results. Included in the latter or
hose requiring operation were 6 patients who
ained perforations of the esophagus during
tation; 2 of 6 died as a result of perforation,
mortality for the treatment of achalasia by
tation. Thirty patients had operations for
lasia; 22 had a modified Heller procedure,
8 were treated with other procedures (1
licz retrograde dilatation, 5 Wendel cardio-
ty and 2 Heyrovsky esophagogastrostomy.
lts of the modified Heller procedure were
in almost 80% of the patients, and there
no operative mortality. Of those with other
edures, 4 (50%) developed esophagitis, and
d good results. Of 5 (21%) with poor results
the modified Heller procedure, all 5 had
rgitative esophagitis, 4 required reoperation
3 had dilatations. Contributing factors to
atisfactory results after the modified Heller
cedure included technical errors, development
postoperative hiatal hernia and partial gas-
outlet obstruction leading to reflux
phagitis. It is concluded that the modified
ler procedure (esophagocardiomyotomy) is
ective and deserves wider application as
tial treatment for selected patients with
alasia.

3 EXPERIENCES WITH THE TREATMENT OF 59 PATIENTS WITH LOWER ESOPHAGEAL WEB.

) Postlethwait, R. W. (Duke U. Med. Ctr.,
ham, N. C.) and W. C. Sealy. Ann. Surg.
(5):786-796, 1967.

tal of 59 patients (52 men, 7 women; 37-78
old) were treated for lower esophageal web
hatzki's ring). Episodic aphagia was the
t prominent symptom in 38, while progressive
ficulty in swallowing was present in 14; 7
no dysphagia. Symptoms of reflux were pre-
t in 19, although only 6 had slight and 2
erate esophagitis by esophagoscopy (the latter
done on 43, and the web identified in 18).
tal hernia repair and partial excision of the
was done on 15 patients. Five had no
urrence of hernia or web, and remained
mptomatic; 5 had a recurrent web but were
l, while 5 also had recurrence of the web
h associated difficulties. Seven patients
hiatal hernia repair and digital dilatation
of the web; 2 were asymptomatic with no recurrence, while 2 had recurrence of both web and hernia, with symptoms of reflux. Hiatal hernia repair only was performed on 14; 3 who had reflux were relieved and 3 who had episodic aphagia were improved. Two who had mild dysphagia had no further difficulty in swallowing but experienced occasional heartburn. Postoperative dilatations were necessary in 4 and another refused dilatation. One was operated upon for symptoms of marked reflux. In those who had satisfactory radiographs during follow-up studies, the web was present in 6 and was not visualized in 3. Dilatation of the esophageal web was done on 11 patients; in 9 there was no subsequent dysphagia. Twelve patients were managed by diet alone (eating slowly, taking small bites and chewing food thoroughly); 6 were asymptomatic, 1 takes liquids only, and 1 was considered to have done well on the diet (this patient subsequently died of myocardial infarction), while 1 had dysphagia if tense, 1 experienced occasional dysphagia and 1 had complications in swallowing a meat bolus. It is concluded that the most conservative management consistent with good results appears to be indicated in the management of the lower esophageal web.

8124 RESECTION OF SQUAMOUS-CELL CARCINOMA OF THE OESOPHAGUS WITH END-TO-END OESOPHAGEAL ANASTOMOSIS.

(E.) Davidson, J. S. (Roy. Infirm., Bradford, England). Brit. J. Surg. 54(1):63-70, 1967.

Case reports are given of 10 resections of squamous cell carcinoma of the esophagus with direct anastomosis. One patient with an inoperable tumor died from disruption of the anastomosis. Four had good results: 1 with a carcinoma of the junction of the middle and lower thirds of the esophagus is alive and free from symptoms after 9 yr.; 1 with a carcinoma in the upper third is alive and well after 6.5 yr.; the other 2 died at 80 and 90 yr., resp., the former living in good health for 6 yr. In 5 the results of surgery were poor, with survival of 5 mo. - 2 yr., 7 mo.; in 3 there was histological evidence of inadequate excision; of these, 1 died after a yr., without recurrence in the esophagus, 1 had early local recurrence successfully treated with radiotherapy, and 1, who also had postoperative radiotherapy, did not develop recurrence; recurrence at the anastomosis was not observed in the other 2, although in neither was growth found at the ends of the resected specimens. Criteria for the selection of cases were that the lesion should be seen as a smooth, hard structure less than 5 cm in length. Of 9 who left the hospital, significant dysphagia occurred in 4. Failure to excise an adequate length of esophagus was the main cause of recurrence in this and a longer series. The disadvantages of this procedure (limited applicability; only small excision; high incidence of postoperative dysphagia) are contrasted with its advantages (short procedure; useful in the elderly and ill; patient left with normal alimentary tract and excellent nutrition; no anemia, esophagitis, or sequelae from derangement of Ca metabolism).

8125 RESECTION OF CARDIO-ESOPHAGEAL CARCINOMA. FACTORS CONTRIBUTING TO ITS MORTALITY, PALLIATION, AND CURE. (E.) Magill, T. G. (Columbia-Presbyterian Med. Ctr., N. Y.) and R. L. Simmons. Arch. Surg. (Chicago) 94(6): 865-870, 1967.

Factors which contributed to the operative mortality, palliation and cure rates obtained in 109 cases of esophagogastric resection for carcinoma of the esophagogastric junction were studied over a 20-yr. period, with 98% follow-up. Total operative mortality was 11.9%, which was significantly less than that obtained before 1950 (41%). Patients were considered to have received successful palliative treatment if they survived more than 6 mo. with good deglutition; of all patients, 61.5% were palliated by the procedure. The 5-yr. clinical cure rate for the operative procedure was 7.7% and 9.3% for esophageal and gastric lesions, resp. Operative mortality for the esophageal patients was confined to the 60-69 age range; the stomach group had essentially equal rates for all ages. Two of the three 5-yr. survivors of esophageal lesions were in the 40-49 age group, while 4 of the 5 cures obtained for the stomach were in patients below 60 yr. old. Sixteen of 75 cases (21.3%) of the stomach were in the youngest age group, while only 2 of 34 (6%) esophageal lesions were resected at this age. There were 23 (21.1%) cases of leakage at the proximal suture line in this series; of the 23 patients, 13 (56.5%) died within a 3-mo. period after operation. In 13 early postoperative deaths, 7 were due to leakage at the proximal suture line. Increasing age, extensive spread of the local disease and proximal anastomotic suture line involvement were correlated with poor palliative and curative results. The type of anastomosis and pathology of the lesion could not be correlated with palliative or curative results.

8126 CONCERNING THE BLOOD SUPPLY TO THE TRANSPLANTS USED FOR TOTAL ESOPHAGOPLASTY. (Rus.) Filin, V. I. (Milit. Med. Acad., Leningrad, USSR), A. I. Reshetov and V. F. Zhupan. Vestn. Khir. Grekov. 98(1):32-36, 1967.

A partial necrosis of the large intestine developed in 9 of 40 patients during plastic surgery for lesions of the cervical part of the esophagus and pharynx. There were primary and secondary disturbances in the blood supply of the transplanted organ. Special anatomic and clinical studies revealed that extraorganic vascular bonds were worse in transplants forme from small intestine and stomach, and better i those developed from large intestine. Not all arteries of the small intestine began from the upper mesenteric artery independently; some began from the general stem, giving 2-4 intestinal arteries (in 23 of 40 preparations). In several cases, the upper mesenteric vein and artery had a different number of rami, i.e., 15 of 40 preparations, the number of intestina veins was less than the total amount of intestinal arteries, exhibiting a difference o 1 in 10 of 15 cases, 2 in 4 of 15 cases and 3 1 of 15. In 31 preparations, several intestin veins (2-5) united with the general stem and then flowed into the upper mesenteric vein. In 45 preparations, an anastomosis between the right and left gastro-omental arteries was satisfactory in 19, poor in 10 and absent in 1 It was also found that extraorganic vascular connections were not equally pronounced for different parts of the large intestine, i.e., good, pronounced connections in the right half of the large intestine were found in 19 of 30 preparations, and in the left half of the larg intestine, in 25 of 30 preparations. These findings were demonstrated clinically. Thus, a transplant formed from the left half of the large intestine is better for feeding conditio than that from the right half; an artificial esophagus could almost always be formed from the large intestine. In 26 of 30 preparations of the large intestine, the number and pattern of basic venous stems correlated with the numb and pattern of similar veins. Of some significance during the formation of the trans plant from the small or large intestine was th lack of correlation of the level of the primar division of the basic large intestinal arterie and the level of the input of main rami in similar basic intestinal veins. Such inconsistencies were most frequently found in the right half of the large intestine and occurred more frequently with the ileocolic artery (in third of the cadavers) than with the right and central colic arteries (one-seventh of the cadavers). Intraorgan vascular anastomoses we more pronounced in the gastric transplants and somewhat poorer in those of the large or small intestine. In 32 human cadavers, there was sufficient intraorgan arterial and venous anastomoses in various parts of the small and large intestine for a length of 5-7 cm; this was clinically verified. Venous intraorgan anastomoses of the stomach were more often inadequate than arterial anastomoses. Therefore, in feeding through a transplant, intra- and extraorganic vascular connections are important. Secondary vascular disturbances developed after packing of the transplant in t s.c. or intrathoracic bed; they were provoked by pressing, bending, pulling and twisting, thrombosis or emobili or of the intra- and extraorganic vessels, etc.

7 VAGOTOMY AND PYLOROPLASTY IN THE
MANAGEMENT OF HIATAL HERNIA. (E.)
sant, J. H., R. L. Payne, Jr. and R. E.
lpine. Ann. Surg. 165(6):888-893, 1967.

ty patients (28 women, 22 men; 28-76 yr. old;
were over 40 yr. old) with hiatal hernias
ra-esophageal hernias in 5 patients, sliding
nias in 45) were evaluated and operated upon;
her vagotomy and pyloroplasty or hemogastrectomy
e combined with repair of hernias in 37
ients. The most frequent major presenting
plaints were heartburn (78%) and obstruction
%); others included acute gastrointestinal
orrhage (16%), chronic anemia (16%), pain
%), nausea or vomiting (36%) and excessive
ching (92%). Uncontrolled reflux esophagitis
cases or 48%) was the major indication for
ration. Free HCl, measured in 35 patients
h sliding hernias, was above 20 mEq/liter in
and more than 40 mEq/liter in 15.
ophagoscopy, performed on 34 patients, proved
t useful in evaluating patients with sliding
tal hernias; 30 of 34 patients who were
ophagoscoped had visual evidence of esophagitis.
those with sliding hernias, 21 had upper
ominal lesions; 7 had gallbladder disease and
had either duodenal or gastric ulcers.
gical treatment of hiatal hernia included
ominal repair of sliding hernia plus vagotomy
37 (74%), abdominal repair of sliding hernia
3 (6%), thoracic repair of para-esophageal
nia in 5 (10%), thoracic repair of sliding
nia in 3 (6%) and esophageal resection in 2
). There were no deaths. Six patients
eloped postoperative complications; wound
ections in 5 and thrombophlebitis in 1. Long-
m complications after vagotomy and pyloro-
sty in 35 patients with a sliding hernia
of whom were followed for more than a yr.)
luded diarrhea, bloating and cramps in 10
%), nausea and vomiting in 5 (14%) and the
ping syndrome in 1 (3%). No patient in whom
otomy was performed developed symptoms of
urrent hiatal hernia, although 1 of 18 who
follow-up X-ray studies had anatomic
urrence.

8 SOLID BENIGN TUMORS OF THE ESOPHAGUS.
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Sch. Med., Milwaukee, Wis.), T. M. O'Connor
W. Weisel. Ann. Thorac. Surg. 4(1):80-91,
7.

9 BENIGN TUMORS OF THE ESOPHAGUS. (Ger.)
Wirbatz, W. (Robert Rossle Clin.,
lin) and B. Mateev. Radiol. Diagn. (Berlin)
):33-46, 1967.

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CARDIAL JUNCTION. (It.) Calvi, L.
tebenefratelli Ciceri-Agnesi Hosp., Milan,
ly). Policlinico [Prat.] 74(20):661-667, 1967.

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8133 RADIOTHERAPY IN THE TREATMENT OF CANCER OF THE OESOPHAGUS. (E.) Watson, T. A. (U. Western Ontario, London, Canada.) Radiol. Clin. (Basel) 36(1):1-14, 1967.

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8137 BIPOLAR ESOPHAGEAL BY-PASS. (Fr.) Maillard, J. N. (Beaujon Hosp., Clichy, France), B. Launois and O. Galvao. Ann. Chir. 21(7-8):465-473, 1967.

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8139 SURGERY OF THE CARDIOESOPHAGEAL REGION. (Fr.) Guillemin, G. and G. Spay. Lyon Chir. 63(1):139-142, 1967.

8140 TREATMENT OF HIATAL HERNIA AND ESOPHAGEAL REFLUX BY CARDIOPEXY WITH ROUND LIGAMENT OF THE LIVER. (Fr.) Rampal, M. (Timone Hosp., Marseille, France), P. Perillat, J. Figarella, R. Julie and J. Bonnet. Presse Med. 75(12):617-619, 1967.

8141 SURGICAL TREATMENT OF HIATUS HERNIA. (Rus.) Utkin, V. V. (2nd Surg. Clin., Riga, USSR) and N. A. Balynia. Vestn. Khir. Grekov 98(6):30-36, 1967.

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8151 ANESTHETIZATION AND RESUSCITATION IN CONGENITAL ATRESIA OF ESOPHAGUS. (Bul.) Atanasov, A. (Pavlov Med. Inst., Plovdiv, Bulgaria). Khirurgiia (Sofia) 20(2):144-147, 1967.

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8159 CRITICAL OBSERVATIONS ON TREATMENT OF SO-CALLED CARDIOSPASM. (Ger.) Rose, K. G. (Ear, Nose & Throat Clin., Erfurt, Germa Deutsch. Gesundh. 22(21):972-976, 1967.

8160 PERMANENT SEGMENTARY SPASM OF THE DIST END OF THE GASTRIC TUBE, RESEMBLING ESOPHAGUS ACHALASIA, AS A LATE COMPLICATION OF ESOPHAGOPLASTY. (Fr.) Gavriliu, D. (Carol Davilla Hosp., Bucharest). Ann. Chir. 21(7-8) 474-477, 1967.

8161 DIFFUSE ESOPHAGEAL SPASM. (E.) (Rev.) Fleshler, B. (Western Reserve U. Sch.

, Cleveland, Ohio). Gastroenterology 52(3): 564, 1967.

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RESPIRATORY DEFICIENCY IN CHILDREN DUE TO FOREIGN BODIES OF THE ESOPHAGUS.

(Ger.) Arndt, H. J. (U. Kiel, Germany). Med. Welt 18(25):1536-1539, 1967.

8164 SOME COMPLICATIONS DEVELOPING IN ARTIFICIAL ESOPHAGUS. THEIR PROPHYLAXIS AND TREATMENT. (Rus.) Popov, V. I. (Kirov Order of Lenin Med. Acad., Leningrad, USSR), V. I. Filin and V. F. Zhupan. Klin. Khir. (Kiev) (6):38-39, 1967.

See also abstract nos.: 7899,7992,8170

8165 ALTERATIONS IN MUSCULAR AND ELECTRICAL ACTIVITY OF THE STOMACH FOLLOWING VAGOTOMY. (E.) Nelsen, T. S. (Stanford U. Sch. Med., Palo Alto, Calif.), E. H. Eigenbrodt, L. A. Keoshian, C. Bunker and L. Johnson. Arch. Surg. (Chicago) 94(6):821-835, 1967.

Mongrel dogs (12) were laparotomized, and 6 of them each instrumented with 2 or 3 strain gauge type transducers and 3-5 stainless steel electrodes; the strain gauge transducers were placed so that the orientation of the sensitive element was parallel to the underlying circular muscle. The upper gauge was placed on the body of the stomach, the middle gauge on the midantrum and the lower gauge on the pyloric ring when a pyloric transducer was used. After healing of the operative wound, each animal underwent at least 2 insulin and feeding tests in addition to the recording of fasting activity before vagotomy was performed. Bilateral truncal vagotomy was performed in 10 animals, and selective vagotomy in 2. Responses to food and insulin were usually recorded for 2.5-4.0 hr.; feeding tests were limited to 250 g or less of proprietary dog food in order to avoid overdistention of the stomach and alteration of the transducer-gastric wall geometric relationship. Insulin tests were performed by a single i.v. inj. of sufficient regular insulin to reduce the blood glucose to 50 mg/100 ml (usually 12-15 U). These experiments were designed to characterize the motor and electrical disturbances created in the stomach by vagotomy. After vagotomy there was a lowering of mean gastric mechanical electrical rate and a great increase in rate variation and complexity of propagation paths (desynchronization), and an alteration of the character of fasting motor activity (diminution of phasic activity, relative accentuation of tonic activity and desynchronization). Vagotomy also produced a diminution in amplitude and duration of the motor response to food and pyloric opening for a greater percentage of the time than the normal. Selective vagotomy produced no discernible difference in rate change or work function from bilateral truncal vagotomy. Application of these findings to understanding of the clinical problem of postvagotomy motor disturbances is discussed in detail.

8166 MOTOR AND SECRETORY FUNCTION OF THE STOMACH IN DISEASES OF THE GALLBLADDER AND BILE DUCTS. (Pol.) Jasieński, S. (3rd Surg. Clin., Cracow, Poland). Folia Med. Cracov. 8(4):533-627, 1966.

Gastric function was assessed in patients with gallbladder and bile duct disease, and results were compared with those from healthy individuals. Movements of the gastric walls were recorded by measurement of intragastric pressure. There were distinct changes in the appearance of gastograms in patients with biliary tract disease; waves were irregular, of various shape and character, and had an increased amplitude. Disorders in gastric motor function were proportional to the disease state in the gallbladder and its surroundings. The changes were not specific for any particular disease, being an expression of the lesions in the course of inflammation and their influence on other parts of the body, especially in the region of the infectious focus Gastric motor malfunction occurred in other diseases, such as gastrointestinal neuroses an gallbladder cancer; disorders persisted even after surgical removal of the gallbladder. In all of the diseases studied, gastric evacuatio of the Ba meal was markedly delayed compared w healthy normals; this was due to ineffective hyperperistalsis and reflex pylorospasm. Secr tion was assessed on the basis of fractionated portions of gastric juice after admin. of histamine. Dual analysis of the free and boun HCl and pH showed that pathologic processes in the gallbladder caused disorders of gastric acidity. The primary disease is presumably ac companied by gastritis, which may be either hy acidic or hypoacidic. In protracted disease, progressive anatomic changes in the stomach an gallbladder, and advancing age of the patients led to hypoacidic or achlorhydric gastritis. In patients with cholecystitis and cholelithia the efficiency of conc. and excretion of Cl, b free and bound, Na and K were distinctly distu In advanced stages, disorders in values of Na and Cl became more pronounced, but K levels we not distinctly affected. Pepsin levels were higher in the course of cholecystitis, especia in advanced cases, than in healthy persons. Levels of pepsin in gastric juice appeared to inversely proportional to acidity. Gastrochro copy showed markedly impaired excretion of the dye through the gastric mucosa in advanced dis of long duration in older patients; this signi further disturbance of secretory function. Inflammation and other uncomplicated pathologic processes in the gallbladder and bile ducts ha little, or no, effect on the level of total serum proteins. However, the total protein wa markedly increased in the gastric juice of pat especially in advanced disease of long duratio in older patients. Rise in γ-globulins was undoubtedly pathologic and resulted from excessi production of mucus and insufficiency of the gastric glands. Immunoelectrophoresis yielded much smaller quantity of protein fractions in the gastric juice than in serum, especially in advanced inflammatory changes in the gallblad

8167 GASTRIC EMPTYING AND PROPULSIVE INTESTINAL MOTILITY FOLLOWING PARTIAL GASTRIC RESECTION, GASTROENTEROANASTOMOSIS, A ABDOMINAL "TRUNK" VAGOTOMY IN THE RAT. (E.) Nylander, G. (Hosp. Acad., Uppsala, Sweden) a S. Wilkström. Acta Chir. Scand. 133(1):41-54, 1967.

Gastric emptying and propulsive intestinal motility were studied in 290 white laboratory rats divided into an intact control group and perimental groups; the latter consisted of th having the following procedures: Group 1, pa

ric resection with gastroduodenal anastomosis;
ıp 2, partial gastric resection with gastro-
inal anastomosis; Group 3, partial gastric
ction with gastrojejunal anastomosis with
eroanastomosis between the afferent and ef-
ent jejunal loop; Group 4, gastrojejunal
stomosis, excised pylorus, but otherwise intact
nach; Group 5, abdominal "trunk" vagotomy with-
pyloroplasty; and Group 6, abdominal "trunk"
otomy with pyloroplasty. The methods of
ysis comprised direct and indirect measure-
of the quantitative distribution in the
rointestinal tract of $Na_2{}^{51}CrO_4$ at different
ervals after its deposition in the stomach
0 min.). Gastric emptying followed an ex-
ential course in intact controls. In Groups
d 2, gastric emptying showed a more marked
asic course. During the first 15-min. period
emptying was faster than normal, and during
second period it was wholly arrested. Rats
roup 1 had a somewhat faster emptying time.
roup 3, the same proportion of gastric dose
evacuated during the first 15-min. period as
controls. The enteroanastomosis had a retard-
effect on the initially rapid emptying of
gastrojejunostomy. In Group 4, emptying was
er than normal and almost unchanged during
two 15-min. periods. The emptying curve
ered from normal and was more linear. There
retarded gastric emptying in Group 5. The
ying curve agreed in principle with the normal,
initially rapid and subsequently slower course.
roup 6, gastric emptying was quantitatively
al after 30 min.; the effect of vagal denerva-
was eliminated by pyloroplasty. The quanti-
ve distribution in the small intestine of
evacuated portion was expressed as its per-
ile presence in the proximal half of the
l intestine, being given as a function of the
erimental period. Normally, this function was
he same character as that of gastric emptying.
or activity of gastric emptying and the pro-
ive motility of the small intestine were in-
ately correlated in the intact rat. The same
ationship was noted in Groups 1 and 2. The
ially accelerated and subsequently arrested
ric emptying was reflected by initially
id and later discontinued distal distribution
he evacuated portion. The initially acceler-
emptying of the gastric remnant was thought
ave been of essentially hydrostatic deriva-
; the arrested evacuation was attributed to
uction in the contents and mural tension in
gastric remnant in combination with the
ative resistance to continued passive outflow
stituted by the proximal situation of the
cuated portion. The normal extent of gastric
tying in Group 3 after 15 min. was reflected
extreme proximal distribution of the evacuated
tion. Agreement between the course of gastric
tying and the intestinal distribution of the
cuated portion was also noted in Group 4;
courses were linear. This agreement was not
erved in Group 5; the initially faster course
the emptying curve was not reflected by any
distal conc. of the evacuated portion. In
up 6 gastric emptying was roughly normal after
30 min.; at this juncture the pattern of distribution was identical to that in the intact controls. Since both gastric emptying and the distribution in the small intestine of the evacuated portion were normalized after pyloroplasty, vagotomy was regarded as affecting chiefly the function of the pylorus.

8168 GASTRIC FUNCTION IN PATIENTS WITH GASTRIC CARCINOMA. (E.) Shearman, D. J. C. (Roy. Infirm., Edinburgh), N. D. C. Finlayson and R. Wilson. Lancet 1(7486):343-346, 1967.

Gastric acid and intrinsic factor output was studied in 22 patients (13 men, 9 women) with gastric cancer; controls included 11 cases of gastric ulcer (7 men, 4 women), 9 cases of duodenal ulcer (7 men, 2 women) and 10 patients without gastric disorder (7 men, 3 women). The mean output of acid in gastric carcinoma patients was 4.9 mEq (range 0-33.48 mEq); in those with gastric ulcer it was 14.4 mEq (range 3.41-34.41 mEq); in those without gastric disorder and in persons with duodenal ulcer it was 18.7 mEq (range 9.0-39.0 mEq) and 33.1 mEq (range 10.8-66.0 mEq), resp. The difference between the first two groups was statistically significant. Mean intrinsic-factor output for gastric carcinoma patients was 3230 ng U (range 4444-9022 ng U), and for gastric ulcer patients it was 12,840 ng U (range 6026-23,097 ng U); this difference also was statistically significant. In those without gastric disorder and in persons with duodenal ulcer the mean intrinsic-factor output was 14,800 ng U (range 6000-31,800 ng U) and 22,954 (range 10,900-32,900 ng U), resp. No patient with intrinsic-factor antibody was found, but the 2 patients with parietal-cell antibody were achlorhydric and also had the lowest intrinsic-factor outputs. There was no correlation between the extent of gastric mucosal involvement by neoplasm and the results of gastric secretory tests. With regard to tumor site, those patients with higher acid and intrinsic-factor secretion tended to have antral or pyloric tumors, but this division was not absolute. These findings confirm the high incidence of hypo- and anacidity, in addition to a significant depression of intrinsic-factor secretion, in gastric carcinoma.

8169 REACTIVE AND NONREACTIVE ALUMINUM HYDROXIDE GELS. DOSE-RESPONSE RELATIONSHIPS IN VIVO. (E.) Littman, A. (U. Illinois, Chicago). Gastroenterology 52(6):948-951, 1967.

Five aluminum hydroxide gels were prepared with greatly differing solubility in dilute acid; aqueous soln. of aluminum chloride were reacted with sodium carbonate for the reactive types and with ammonia for the nonreactive types. The "acid-consuming capacity" for each gel was determined by the United States Pharmacopeia XV method, in which a weighed amount of gel is shaken for 1 hr. with an excess of 0.1 N HCl at 37°C; the excess acid is titrated with 0.1 N NaOH, using bromophenol blue as the indicator. The composition and properties of each gel was as follows: 1) reactive type, 4.65% Al_2O_3 (wt./wt.), 1.29 ml of gel containing 60 mg Al_2O_3 and 140.5 ml acid-consuming capacity; 2) reactive plus nonreactive, 3.95%, 1.52 ml and 100.8; 3) reactive, 1.74%, 3.37 ml and 61.1; 4) nonreactive, 3.19%, 1.88 ml and 37.0; and 5) nonreactive 1.62%, 3.64 ml and 6.3. The duration of "neutralization" produced by these gels in doses ranging from 7.5-60.0 ml was tested in male patients with basal hypersecretion. *In vivo* results corresponded in general with those obtained *in vitro*. For the more reactive gels (1 and 2), the duration of neutralization increased linearly with logarithm of dose. A 30-ml dose of the more reactive gels produced a pH above 3 lasting 15 min. or more in 90% of the subjects, 30 min. or more in 60%, and 45 min. or more in 30%. Duration of effect was not related to basal secretory rate, except for 7.5 ml doses. For nonreactive gels, increasing the dose had little effect in producing a pH of 3 or more, as based on the criterion of effect for 30 min. or longer. Effectiveness of the gels corresponded to the numerical order described earlier. Reactive (acid-soluble) gels were more effective than insoluble or nonreactive gels. For reactive gels the major factor limiting the duration of neutralization appeared to be gastric emptying.

8170 EXPLORATORY GASTROTOMY IN MANAGEMENT OF MASSIVE UPPER GASTROINTESTINAL HEMORRHAGE. (E.) Freeark, R. J. (Northwestern U. Sch. Med., Chicago, Ill.), W. J. Norcross and R. J. Baker. *Arch. Surg. (Chicago)* 94(5): 684-695, 1967.

Exploratory (long) gastrotomy was performed on 77 patients who required surgery for the control of massive upper gastrointestinal bleeding of undetermined origin. The patients were divided into 2 groups according to the presence or abscence of an abnormality noted at the time of laparotomy and before gastrotomy. Group 1 included 47 patients without any findings at the time of laparotomy to suggest the site of bleeding, and in whom exploration of the widely opened stomach was performed in order to establish the cause. Among the lesions encountered in this series were gastric ulcer in 15, Mallory-Weiss syndrome in 11, duodenal ulcer in 8, diffuse mucosal hemorrhage in 5, ruptured sclerotic vessel in 3, duodenal reduplication and pseudoxanthoma elasticum in 1 each, and the bleeding site was not identified in 3. Group 2 included 30 patients in whom some abnormality was noted before gastrotomy, but gastrotomy was performed because of the uncertainty concerning the relationship of the abnormality to the cause of bleeding. This series included liver cirrhosis in 12, subserosal hemorrhage in 5, perigastric mass in 7, and splenomegaly and postgastrectomy bleeding in 3 each. A significant number of the bleeding sources identified could not have been controlled by empiric resection of the distal two-thirds of the stomach. These results suggest that a properly performed exploratory gastrotomy is a
reliable method of identifying the source of
hemorrhage, and provides access for the defini
treatment of a significant number of otherwise
obscure esophageal, gastric and duodenal lesio

8171 ISOLATION OF THE AUTOANTIGENS RESPON
FOR AUTOANTIBODY FORMATION IN SEIZUR
OF GASTRIC CANCER. (Fr.) Karitzky, D. (Cance
Sci. Res. Inst., Villejuif, France) and P. Bur
Europ. J. Biochem. 1(4):411-418, 1967.

The antigen which produces autoantibodies to g
tric carcinoma was isolated from normal and
cancerous gastric mucosa. The active products
were found to be soluble in both perchloric an
phytic acids, and to be precipitated by ammoni
sulfate. After chromatography on DEAE-cellulo
graphs of the normal and cancerous extracts we
found to be similar. The activity of the auto
antigen was found mainly in the first, and to
lesser degree, in the third of 7 peaks (P_1, P_3
P_1 was subjected to Sephadex G 100 filtration,
after which 3 peaks were usually seen: A, B a
C. Slight differences were observed within th
peaks: C was lower after passage of the tumor
extract than after that of normal extracts.
Antigenic activity was seen only in some tubes
of peak C; 10 µg of isolated peak C material,
from a fraction of phytic acid-extracted cance
mucosa, were sufficient to absorb all antibodi
of the patient's sera. After migration in acr
amide agarose this product displayed one singl
band of α_2-globulin mobility. Immunoelectrophoresis revealed only one precipitin line.
When P_3 was filtered on Sephadex G 100, an act
antigen was detected in the A region; the rela
ship of this to the P_1 antigen is still being
investigated. Physicochemical analysis showed
that the purest isolated fraction contained 6%
hexoses; its activity was destroyed by chymotr
but left unaltered by trypsin, ribonuclease ar
heating. Ultracentrifugation gave a sedimenta
constant of 1.83 Svedberg U. A highly-conc.,
highly-active product, which probably represen
the autoantigen in a highly purified state, wa
isolated from the cancerous gastric mucosa. T
substance was of small molecular wt. and almos
entirely protein in nature (only 6% hexoses we
detected); it is thus comparable to the antige
characterized in experimental encephalomyeliti
in guinea pigs. Gel filtration of nonlyophili
unfractionated extracts of normal gastric muc
yielded a product having the same immunologica
specificity as the pure product; this was evid
against denaturation during fractionation. Co
parison between the fractions obtained from
normal and tumorous mucosa showed complete ide
as demonstrated by electrophoretic and immunoelectrophoretic studies. With material from
normal mucosa it was impossible to attain the
level of purity of the tumor material. It was
chemically shown that the antigen isolated fr
normal gastric mucosa was different from the

rosomal antigen reacting with autoantibodies
pernicious anemia sera. As a hypothetical
nanism for the autoantigenicity of a normal
ponent, it was assumed that substances normally
uestered within the cell are liberated into
blood stream, thus causing formation of auto-
ibodies.

2 LACTIC, PYRUVIC, CITRIC, AND URIC ACID AND UREA CONTENT OF HUMAN GASTRIC JUICE.
) Piper, D. W. (U. Sydney, Australia), B. H.
ton and L. R. Goodman. Gastroenterology
1):42-48, 1967.

conc. and output of lactic, pyruvic, citric
uric acids and urea were studied before and
er histamine (submax.) stimulation in a series
control subjects and patients with gastric
er, duodenal ulcer and gastric carcinoma.
tric carcinoma patients had a higher lactic
d conc. in basal and stimulated gastric juice
a higher lactic acid output in basal secretion
n controls and patients with gastric and
denal ulcer. Gastric ulcer patients had a
er conc. of pyruvic acid in stimulated secre-
n than controls and other patients; the output
stimulated secretion was less in gastric ulcer
ients than in controls and duodenal ulcer
ients. Basal conc. and output were similar in
4 groups except those with duodenal ulcer,
had a lower conc. than gastric carcinoma
ients. Gastric ulcer patients had a lower
al conc. of citric acid than controls and
er patients, and a lower basal output than
trols and duodenal ulcer patients. In the
mulated secretion, gastric ulcer patients had
er citric acid conc. than duodenal ulcer and
tric carcinoma patients. Basal uric acid secre-
on was less in gastric ulcer patients than in
trols; in stimulated secretion, the conc. was
her in carcinoma patients than in duodenal
cer and gastric ulcer patients and the output
less in gastric ulcer patients than controls.
sal output of urea was higher in controls than
gastric ulcer and duodenal ulcer patients. In
imulated secretion, the conc. was lower in duo-
nal ulcer patients than in controls and gastric
rcinoma patients, and the output was higher in
trols than in gastric ulcer and gastric carcino-
patients. There was no correlation of the lac-
c, citric, pyruvic, and uric acid and urea conc.
gastric juice with acid conc. After max. hista-
ne stimulation (in 7 duodenal ulcer patients and
controls), lactic acid conc. and output fell,
ruvic acid conc. and output rose, and citric acid
nc. fell and output rose. The uric acid conc.
d output varied, and the urea conc. fell and
tput varied.

73 ANATOMICAL AND SURGICAL STUDY OF THE ESOPHAGEAL-ABDOMINAL VAGUS. (It.)
ssi, R. (U. Milan, Italy), S. Salvaneschi and
Tajana. Arch. Ital. Chir. 92(5):648-658, 1966.

autopsy study of the number, position, form,
mensions and subdivisions of the esophageal-
dominal vagus nerve in 68 patients, aged 24-87, showed 2 clearly individualized trunks, 1 anterior, 1 posterior, in only 44 cases (64.5%), while multiple anterior and posterior trunks, originating as subdivisions of the 2 principal trunks or arising from plexiform formations, were found in 24 of 68 (35.5%). The positions of the principal trunks were extremely variable, as were their forms and diameters and the points at which the hepatic, gastric and celiac branches left the principal trunk. In 9 of 24 cases in which the principal trunks were multiple, no hepatic branch could be found. It is concluded that total abdominal vagotomy is the procedure of choice for inducing gastric vagal denervation.

8174 RELEASE OF HISTAMINE INTO GASTRIC VENOUS BLOOD FOLLOWING INJURY BY ACETIC OR SALICYLIC ACID. (E.) Johnson, L. R. (U. Michigan, Ann Arbor) and B. F. Overholt. Gastroenterology 52(3):505-509, 1967.

The stomachs of anesthetized dogs were filled with 154 mM NaCl, 100 mM HCl, 100 mM acetic acid, or 20 mM salicylic acid in 100 mM HCl. Gastric venous and femoral arterial blood samples were taken at various intervals for the next 120 min. and their histamine content was determined. Within 5 min. there was a significant increase in the histamine conc. of the blood draining the stomachs filled with acetic acid. A similar increase occurred within 10 min. in the blood from the salicylic acid-treated stomachs. Femoral arterial samples taken concurrently with the gastric venous samples containing the peak amounts of histamine contained little or no histamine. In no experiment was an increase in histamine detected in blood from a stomach containing NaCl or HCl. Histamine always appeared early in the salicylic and acetic acid irrigation soln. and reached peak conc. at 15 min. Histamine was usually absent from the NaCl soln. until 1 hr. of irrigation had elapsed, and then the conc. reached were low. It is concluded that the increased amount of histamine in the gastric venous blood during injury is proof that it is released into the mucosal interstitial fluid, where it can exert its characteristic physiological actions.

8175 SEASONAL VARIATION OF CONGENITAL HYPERTROPHIC PYLORIC STENOSIS. (E.) Kwok, R. H. (Nat. Biomed. Res. Found., Silver Spring, Md.) and G. Avery. J. Pediat. 70(6): 963-965, 1967.

Subjects were 248 patients admitted to a childrens' hospital over a 6-yr. period. Admissions were most numerous in April-May and October-November. The elevated incidence in Spring and Fall was statistically significant compared with Summer or Winter. Neither Spring and Fall nor Winter and Summer were significantly different from one another. There was no relationship between seasonal birth and rate of admission. Further regional studies are suggested

8176 ELIMINATION OF ROUTINE NASOGASTRIC DECOMPRESSION FOLLOWING VAGOTOMY-ANTRECTOMY AND VAGOTOMY WITH PYLOROPLASTY OR GASTROENTEROSTOMY. (E.) Herrington, J. L., Jr. (Vanderbilt U. Med. Ctr., Nashville, Tenn.). Amer. Surg. 33(5):361-364, 1967.

In 275 operations for definitive treatment of complications of duodenal ulcer, routine postoperative gastric decompression was not performed. Decompression was used only if circumstances at operation required it; suction was immediately instituted if postoperative complications developed. Surgical procedures were: vagotomy-antrectomy, Billroth I (183), Billroth II (6); vagotomy-pyloroplasty (81); vagotomy-gastroenterostomy (5). Of the 275, 246 (90%) were elective procedures, the rest emergencies. In 227 (83%) postoperative gastric decompression was not used, and patients fared well; in the rest, decompression was a vital adjunct to recovery. Of the 227 not requiring suction, 214 (94%) were undergoing elective surgery; of the remaining 13, all of whom sought early surgical treatment, 7 had acute ulcer perforation, 6 massive bleeding. Of 48 who required postoperative suction, 32 (67%) were elective cases. Of these, 4 were operated on late (more than 12 hr.) after ulcer perforation; gastric spillage and ileus were pronounced at operation, and suction was considered necessary. Of the other 44 requiring suction, 4 bled from fresh gastric suture lines during early postoperative period; 11 developed early abdominal distention; 15 required a technically difficult initial operative procedure; 14 underwent definitive operation for massive bleeding. Postoperative decompression was employed in 32 of 246 (13%) elective cases. Of 29 emergency cases, suction was used and played a vital role in recovery in 16 (55%). Postoperative suction was used in 49 of 300 (16%) patients treated for duodenal ulcer. It is concluded that postoperative gastric decompression should be performed only when definitely indicated.

8177 VAGUS REGENERATION IN THE DOG. (E.) Jefferson, N. C. (Michael Reese Hosp., Chicago, Ill.), A. Geisel, P. Lott, Jr. and H. Necheles. Surgery 61(5):808-811, 1967.

The chests of mongrel dogs were opened, 2-3 cm of each branch of the vagus nerves was resected; ends were tied with silk, and small nerve filaments were sectioned similarly. Up to 2 yr. after vagotomy fasted dogs were anesthetized, vagi were exposed in the neck, sectioned, and electrodes placed on the peripheral ends; tubes passed p.o. into the esophagus and stomach registered motility; peripheral ends of the vagus nerves, well above and below the section were stimulated, while gastric and esophageal motility were recorded. Tube position was verified at autopsy. In a number of dogs, fibers were seen originating from above the tie at the central end of the vagus and running to the peripheral end. Tissue sections were taken above, between and below the cut vagus nerves and stained with hematoxylin and eosin and myelin stains. At 1 and 3.5 mo. no functional recovery of the vagus nerves, as indicated by the absence of contract upon stimulation of the peripheral ends of the cut vagi, was observed. Of 8 observed at 12-21 mo., 7 displayed distinct gastric contractions height between 3-50 cm H2O. Distinct nerve branches were seen between the cut ends of the in these 7. Gastric motor response varied with time elapsed since vagotomy. In another series of 20 vagotomized dogs, no visible regenerated nerve fibers were observed within 1 yr.

8178 THE DUODENAL SPREAD OF GASTRIC CARCIN (E.) Paramanandhan, T. L. (U. Singap Brit. J. Surg. 54(3):169-174, 1967.

Necropsy material was from 29 patients (22 men, 7 women; 17-82 yr. at death), with gastric prim carcinoma, none with previous gastric resection The site of the primary gastric carcinoma was: cardia and fundus (13.9%); lesser curvature (27.6%); greater curvature (3.5%); pyloric antr and canal (34.5%); whole stomach (20.7%). All 26 showed invasion of the serosa, were Grade 3-adenocarcinomas (Broders) and had lymph node involvement. In 24, the subpyloric group of lymph nodes was involved and in 20 of these, the duodenum was involved. One showed invasion of the veins in both the stomach and proximal duodenum. Three of 29 (10%) showed macroscopic invasion of the duodenum, with wrinkled duodena mucosa and no sharp distinction between duodena and gastric mucosa. Microscopic duodenal invas was seen in 20 (69%), with mucosa and submucosa usually involved. In all cases of pyloric carcinoma, there was some lymphocytic infiltration of the duodenum, which could be interpreted as representing stasis produced by proximal permeation of malignant cells. In 17, invasion of th duodenum occurred chiefly through the lymphatic in 3, by direct infiltration of sheets of anaplastic cells. Surface epithelium and Brunner' glands seemed to be resistant. Tumor spread wa more marked along the lesser curvature than the greater, although in most cases the primary tum was along the line of the lesser curvature. In a few cases where the tumor was only along the greater curvature, there was no invasion of duodenum. Involvement of duodenal layers was: submucosa only, 2; muscularis only, 1; serosa only, 2; mucosa and submucosa, 2; mucosa, submucosa, muscularis, 1; submucosa and serosa, 8; muscularis and serosa, 1; all layers, 3. When serosa was involved, invasion was generally extensive. Extent of spread was 0.5-22.6 cm. In 11, there was no tumor beyond the first 3 cm of duodenum. In contrast to earlier studies, i is concluded that gastric lesions do invade the duodenum.

8179 CHILDHOOD PERNICIOUS ANEMIA. GASTROINTESTINAL SECRETORY, HISTOLOGICAL, AND ELECTRON MICROSCOPIC ASPECTS. (E.) Lillibridge, C. B. (U. Washington, Seattle), L. Brandborg and C. E. Rubin. Gastroenterology 52(5):792-809, 1967.

secretion of acid, pepsin, and intrinsic
or was studied in 9 children with true juvenile
icious anemia, 6 with Imerslund's syndrome,
3 with pernicious anemia associated with
ric atrophy. Biopsies of gastric mucosa were
ied by light and electron microscopy. Secre-
of intrinsic factor was low in juvenile
icious anemia and atrophy-associated anemia,
was normal to moderately reduced in those with
slund's syndrome. By the authors' examina-
, acid secretion was normal during periods
dequate vitamin B_{12} therapy, both in juvenile
icious anemia and Imerslund's syndrome. The
ory of those patients showed that during
ods of vitamin B_{12} deficiency, histamine
achlorhydria (not augmented) was frequent.
ric biopsies appeared normal in the juvenile
icious anemia and Imerslund's syndrome patients,
revealed gastric atrophy in all 3 having
lorhydria despite their adequate vitamin B_{12}
lacement. No fine structural abnormalities
detected with the electron microscope. The
rapeutic status correlated poorly with histo-
ical data. Duodenojejunal biopsies appeared
mal although vitamin B_{12} malabsorption had
n demonstrated in Imerslund's syndrome. It is
cluded that the data offer no certain explana-
n of the pathogenesis of gastric atrophy in
nicious anemia of adults.

0 CLINICAL FAILURES IN DIAGNOSIS OF GASTRIC CANCER. (Rus. Nartsissov, T. V.
d. Inst., Gorky, USSR). Vop. Onkol. 12(10):
97, 1966.

ing a 15-yr. period (1946-1960), an error of
gnosis was made in 142 (4.83%) of 2963 pa-
nts (1661 men, 1302 women; 87 of whom were
s than 31 yr. old, 942 were 41-50 yr. old and
7 were 51-60 yr. old) treated surgically for
tric cancer. The greatest percentage of
gnostic error (12.7%) among patients younger
n 31 yr. of age was due to a mild or asympto-
ic course of the disease in its initial stages
a markedly less pronounced disturbance of the
neral condition. The stage of the disease also
fluenced the frequency of error, i.e., the
eatest percentages of diagnostic error were
und in Stages 1 (21.1%) and 2 (6.5%). The
cation o the neoplasm was also important, i.e.,
en located in the distal stomach, diagnostic
ror was 5%; in the gastric body the error was
4%; in the proximal stomach it was 2.5% and
e error for total lesions was 2.0%. In 85%
the patients gastric cancer was mistaken for
rious surgical diseases of the stomach; the
agnostic error for ulcer was 53.5%, for tumors
the abdominal cavity it was 9.2% and for
cute stomach" it was 9.9%. Pain symptomatology
s similar in both cancer patients which were
correctly diagnosed and in controls (148 pa-
ents with a correct diagnosis). Various fac-
rs leading to incorrect diagnosis were an
sence of wt. loss, postcibal epigastric pain,
long history of gastric complaints, other
stric diseases such as ulcer, polyposis and
stritis, and associated diseases such as rheu-
tism, cholecystitis and nephritis. Many
objective symptoms occurred just as frequently in both the control group and in those indirectly diagnosed; however, other symptoms which occurred less frequently in the incorrectly diagnosed group included achlorhydria and tumor palpability, while those which occurred more frequently in the controls included fever. In 89.5% of 125 in the incorrectly-diagnosed group, the patient's radiologist had not recognized malignant tissue, and no X-ray was made in 17. Gastric cancer is most frequently mistaken for ulcer (39.2%), and in 9.6% it was mistaken for polyposis. A distorted clinical picture of gastric cancer was found in 11.6% of the patients. Analysis of the clinical-radiological symptoms revealed that gastric cancer diagnosis could be made in 50; gastric cancer symptoms were present in 79; only in 7 were they not observed and in 6 gastric symptomatology was absent.

8181 GASTRIC SECRETORY FUNCTION DURING CHRONIC INTOXICATION WITH GRANOSAN. (Rus.) Ostapenko, O. F. (Kirgiz Med. Inst., Frunze, USSR). Sovet. Med. 29(11):70-73, 1966.

In 41 patients functional disturbances of gastric secretion were already evident during the early period of chronic intoxication with Granosan (ethyl mercuric chloride); the disturbance was characterized by a decrease of reflex secretion and an increase in the neurochemical phase of secretion. Hyperacidity was present in 22 of the patients, and normo- or hypoacidity in the others. An inert type of gastric secretion was found in 31, an asthenic type in 3, inhibitory in 3, isosecretory in 2 and normal in 2. The quantity of gastric juice was increased (125-300 ml) in 30, decreased in 7 and normal in 4. Two patients exhibited a positive reaction to lactic acid. A large amount of WBC and epithelial cells were found in the gastric sediment of 28 patients. The av. total gastric acidity was 64.7 titer U, and that of free HCl was 42.4. Both were decreased in 16 patients, chiefly during the first phase of gastric secretion. In 18 patients studied at a later period (1-3.5 yr. after appearance of the initial symptoms of intoxication) there was inhibition of the reflex and neurochemical phases of secretion, with a significant reduction in the amount of total and free HCl. The quantity of gastric juice on an empty stomach at an early period was 121 ml, and at a later period it was 52.1 ml; hourly stress yielded 99.7 ml during the early period and 54.5 ml at a later period. The av. amount of total HCl decreased from 69.6 to 44.4 titration U and that of free HCl decreased from 50.6 to 23.9 titration U. In 8 patients, in spite of a decrease in secretion, the total gastric juice acidity varied from 66-82 titration U, and the amount of free HCl from 45-68 titration U. Gastric analysis revealed a large amount of mucus, epithelial cells and segmented-nuclear WBC. Inhibitory and isosecretory types of gastric secretion were increased. These changes probably reflect disturbances of the regulation of secretion by the higher centers of the central nervous system; the local toxic action of Granosan is not excluded.

8182 THE MORBIDITY OF GASTRIC CANCER IN MINSK (1962-1964). (Rus.)

Skoblia, E. S. (Oncol. Dispensary, Minsk, Byelorussian SSR). Vop. Onkol. 12(9):110-111, 1966.

During the period 1962-1964, a diagnosis of gastric cancer was made in 735 (av. 37.6/100,000 population) patients (whose age ranged from less than 29 yr. to over 70) in Minsk; this figure represents 30.1% of all cancers diagnosed. Morbidity per 100,000 was 37.1 for women and 36.4 for men. A study of 719 patients revealed no difference according to age and sex, i.e., males formed 45% and females 55% of the total, and 87.3% of the females and 70.6% of the males were over 50 yr. of age. There was a yearly increase in gastric cancer morbidity, i.e., in 1962, 62.3% and in 1964, 72.5% of the total number recorded with such a diagnosis. The largest percentage of patients in a second clinical group (74.5%) was in the age range of 40-59 yr., while of those over 70 yr. of age, 59% were curable. Of those in the second clinical group, 26.4% were not treated. Those gastric cancer patients in whom the diagnosis was made at postmortem examination represented 8% of the total number of gastric cancer patients registered in 1962-1964; most of them were either less than 35 or more than 60 yr. of age. Of 719 patients, 305 (42.4%) were operated upon; surgery was radical in 176 (24.5% of all patients or 57.7% of all those treated surgically). Operability of gastric cancer patients decreases as age increases; therefore, the best treatment is dependent upon an early diagnosis of gastric cancer.

8183 COMPARATIVE ESTIMATION OF STOMACH RESECTIONS WITH GASTRODUODENO- AND GASTROJEJUNOANASTOMOSIS IN CANCER PATIENTS. (Rus.)

Kravets, B. B. (Regional Oncol. Dispensary, Voronezh, USSR). Vop. Onkol. 12(10):9-16, 1966.

In the Voronezh regional oncologic dispensary, from 1956-1964, 209 (187 of which were for cancer of the distal stomach) gastric resections with gastroduodenoanastomosis (Billroth I) and 239 (186 of which were for cancer of the distal stomach) with gastrojejunoanastomosis (Billroth II) were performed. Most of the patients with the Billroth II procedure were 50-60 yr. old, and those who had Billroth I were 60-70 yr. old. A total of 139 of those with Billroth I and 135 of those with Billroth II had a subtotal and high resection; the resp. values for gastrectomy were 4 and 22, for limiting subtotal resection, 2 and 2, for combined, 35 and 27 and for palliative surgery, 7 and 0. Of 187 patients with Billroth I, lymph node metastases were present in 40.5%, tumor penetration into the gastric serosa in 82.5% and penetration into the surrounding tissue in 18%, as compared to 45%, 77% and 14.5%, resp., in 186 patients with Billroth II. A total of 6.4% of those with the Billroth I resection and 7.5% of those with the Billroth II resection had Stage I cancer; the resp. values of those who had Stage II cancer were 5.3% and 11.8%, for those with Stage III, 84.6% and 80.7% and Stage IV, 3 and 0%. Of 187 patients with Billroth I, 33.1% had exophytic, 5.3% transitional and 61.5% endophytic growth, while the resp. values for 186 patients with Billroth II were 35%, 15% and 50% Postsurgical complications were found in 11.2% those with Billroth I and 9.7% of those with Billroth II procedures. Faulty anastomotic sut were found in 2.4% of the patients with the Billroth I (all in an advanced stage, and 80% with endophytic growth), and 1 of which was cur faulty sutures were found in 2.15% of the patie with Billroth II (all Stage III, 75% with exoph growth). Total mortality after Billroth I was 4.8% and after Billroth II it was 4.3%. A fata outcome due to peritonitis with or without faul sutures of anastomosis for those with Billroth was found in 2.14% or 1.07%, resp.; for those with Billroth II, the resp. values were 2.16% o 1.08%. The higher degree of fatality among tho with Billroth I procedures (9 patients) as compared to those with Billroth II procedures (8 patients) was due to advanced age (73% were over 60 yr.), endophytic growth (in 7 of 9) and the advanced stage (4 of 9 were Stage IV). Excluding one patient who died from carcinomatous cachexia and intoxication, the postsurgical mortality for the Billroth I group and Billroth II group was 4.27 and 4.34%, resp. Of 51 patients with Billroth I procedure, 45 were followed-up for 5 or more yr., and 217 of 231 patients with the Billroth II procedure were observed for the same length of time. Of those in the Billroth I group, 31.4% of those operate upon or 35.5% of those followed, survived for 5 or more yr.; the resp. values for those of th Billroth II group were 31.6% or 33.6%. The best results for those with Stage I cancer were obtained with the Billroth I procedure (71.4% of those with a Billroth I survived for 5 or more yr., compared to 61.5% of those with Billroth I The results for Stages II and III of cancer wer almost identical for both types of operative procedure. Problems of evacuation occurred mor frequently with the Billroth II (2 patients) procedure than with the Billroth I (no patients) It is concluded that Billroth I is at least as effective as Billroth II, and in some cases it was even more effective.

8184 MOTOR-SECRETORY FUNCTION OF THE STOMAC IN EUTHYROIDAL AND TOXIC GOITER. (Rus

Khoromskii, L. N. (Med. Inst., Ternopol, USSR). Probl. Endokr. Gormonoter. 12(6):27-30, 1966.

Of 12 patients with a euthyroid goiter, 4 had disturbances of gastric contraction before surgery (in 3, disturbances were hypokinetic in nature; in 1, they were stimulatory), but 5-7 mo after thyroid surgery no basic changes in gastri motor function were noted and in most patients contractions were normal. In 22 of 39 patients with toxic goiter, either gastric contractions were completely absent during the entire period observation or single arrhythmic contractions of

force of 0.5-1.0 cm H_2O were found; 15 of 39 had
tractions of hypokinetic nature with a force of
cm H_2O. At 5-7 mo. after surgery, gastric motor
ction had returned to normal in 50% of the
ients. In several patients gastric motor func-
n improved but contractions remained hypo-
etic in nature. Only 2 patients exhibited
nesia, compared with 22 before surgery. Thus
tric motor function was inhibited in patients
h toxic goiter. Inhibition of gastric con-
ction was more pronounced in patients with
nounced thyrotoxicosis. In patients with
hyroid goiter, the shifts in gastric motor
ction were much less pronounced. Decrease in
tric muscular tonus was more pronounced in
ients with toxic goiter. In the latter, normal
dings were evident in only 20% of the patients,
6 mo. after surgery 50% had normal values.
dity of gastric juice was approx. 50% of normal
ore surgery in 31 of 39 patients, and was
malized in 50% of the patients 6 mo. after
gery. Acidity of gastric juice remained normal
patients with euthyroid goiter. Various tonics,
h as a 10% soln. of NaCl, Vitamins B_1 and B_{12},
gastric juice, stimulated peristaltic and
ic contractions and increased gastric tonus
0 min. after they had been admin. i.v., i.m.
into the gastric cavity, resp.; NaCl was the
t active and gastric juice was the least active.

35 PATHOLOGICAL CONDITIONS OCCURRING AT LATER PERIODS AFTER GASTRECTOMY. (Rus.)
okhvalov, V. I. Vestn. Khir. Grekov. 97(11):
-88, 1966.

thological conditions occurring within 18 yr.
ter Billroth II gastrectomy for peptic ulcer
06), polyposis (63) and cancer (72) were studied
a total of 741 patients. The dumping syndrome,
rying in severity, was found after 3 yr. in 224
741 (30.2%), after 5 yr. in 191 of 603 (31.6%),
ter 10 yr. in 77 of 235 (32.7%) and after 15 yr.
22 of 67 (32%). The resp. values for the late
poglycemic syndrome were 0.9%, 1.0%, 2.0% and
0%; for the afferent loop syndrome of variable
gree of severity, these values were 9.0%, 10.0%,
.0% and 14.0% of the observed persons. The
all stomach syndrome, found in 14 of 741 (2%),
rsisted for 3-13 yr. after surgery. A moderate-
-severe form of dumping syndrome occurred less
equently in patients with polyposis and cancer
.1%) than in the patients with peptic ulcer (10%)
ter gastrectomy. The frequency of the dumping
ndrome was independent of the use of a short or
ng loop of jejunum for anastomosis; in addition,
e late hypoglycemic syndrome was independent of
e type of gastroenteroanastomosis. Postsurgical
imentary dystrophy, occurring after 3-17 yr.,
s evident in 3 persons. A total of 19 patients
.5%), of whom 6 had repeat surgery (twice in 1
6 patients) for adhesive obstruction, had
rivisceritis. A microcytic anemia of marked
gree was observed in 3 patients. Peptic ulcer
6 yr. after resection was recorded in 5 of 606
.8%) patients. Symptoms characteristic of
ronic gastritis, enterocolitis, cholecystitis
d pancreatitis, were found in 54 of 741 (7.2%) patients 3 yr. after surgery; in some of these, this diagnosis was made before operation. Yearly wt. recording in 100 patients during 5 yr. showed a wt. increase during the first yr. in 73%, no increase in 9% and a decrease in 18%.

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8230 PHYSIOPATHOLOGY OF GASTRODUODENAL RESECTION FOR ULCER. 3. THE PROBLEM OF ANEMIA. (It.) Stipa, S. (U. Catania, Italy), A. Cavallaro, C. Loreto, S. Musumeci and L. Privitera. Ann. Ital. Chir. 43(2):228-272, 1966.

8231 LATE HAEMORRHAGE FROM THE DUODENAL STUMP AFTER GASTRECTOMY. (E.) Sundaram, K. K. (King's Coll. Hosp., London) and R. Yeo. Brit. Med. J. 2(5547):292, 1967.

8232 POST-GASTRECTOMY INTESTINAL OBSTRUCTION. (Por.) Vieira, O. M. (Fac. Med., Rio de Janeiro, Brazil). Rev. Brasil. Med. 24(3): 200-204, 1967.

8233 ACUTE OBSTRUCTION OF THE AFFERENT LOOP AFTER GASTRECTOMY. (E.)(Rev.) Buckberg, G. D. (UCLA Sch. Med., Los Angeles, Calif.). Amer. J. Surg. 113(5):682-687, 1967.

8234 SYMPTOMATIC HYPOGLYCEMIA AFTER GASTRIC RESECTION AND IN ULCER DISEASE IN PRACTICE. (Ger.) Wenig, C. (U. Med. Clin., Hamburg-Eppendorf, Germany) and U. Ritter. Med. Welt 18(26):1563-1567, 1967.

8235 PRIMARY CARCINOMA OF THE GASTRIC STUMP FOLLOWING RESECTION. (Cz.) Vitek, J. (Fac. Med., Brno, Czechoslovakia), F. Vrubel and V. Zejda. Cesk. Radiol. 21(2):105-113, 1967.

8236 NEUROLOGIC DISTURBANCES AND ULCERS AFTER GASTRIC RESECTION. (Rus.) Ishchenko, M. M. (Ternopol Med. Inst., USSR). Zh. Nevropat. Psikhiat. Korsakov 67(6):861-866, 1967.

8237 DIAGNOSTIC USE OF SELECTIVE ARTERIOGRAPHY OF THE CELIAC TRUNK IN CASES OF BENIGN OR INFILTRATIVE DISEASE OF GASTRIC MUCOSA. (Fr.) Albot, G. (Paris, Hosp.), Cl. Hernandez, J. Boisson, S. Veyne, J. Cl. Chaput and L. Farias. Sem. Hop. Paris 43(18/4):1191-1206, 1967.

See also abstract nos.: 7704,7724,7777,7781,7799,7826,7829,7894,7895,7896,
7904,7905,7906,7907,7984,7987,8029,8127,8277,7279

8238 INTESTINAL EPITHELIAL ENZYME ABNORMALITIES INDUCED BY 5-FLUOROURACIL: TRANSLOCATION OF NADPH$_2$-DEHYDROGENASE. (E.) Kaufmann, H. J. (Yale U. Sch. Med., New Haven, Conn.), H. M. Spiro and M. H. Floch. Amer. J. Dig. Dis. 12(6): 598-606, 1967.

Graded doses of 5-fluorouracil were given to mice (48) in 2 separate experiments. In the first experiment, 30 mice were divided into 3 groups: 10 received 75 mg/kg 5-fluorouracil i.p. for 5 consecutive days; 10 received 100 mg/kg for 5 days and 10 received no drug. After 5-fluorouracil treatment, 1 animal from each group was sacrificed each day until the tenth day, with the sixth day being the first day after treatment. In the second experiment, 18 mice were divided into 3 groups: 6 were given 25 mg/kg of 5-fluorouracil i.p. for 5 consecutive days; 6 were given 75 mg/kg; and 6 received saline with no drug. Half of the mice in each group were sacrificed at 6 days, and half at 8 days after onset of drug admin. Specimens of midjejunum and descending colon were taken from each mouse for study. In addition, 3 days after completion of therapy, rectal biopsies were performed on 3 patients treated with 5-fluorouracil (dose not specified). Histochemical studies were performed for reduced nicotine-adenine dinucleotide- and reduced nicotine-adenine dinucleotide phosphate dehydrogenase, succinate dehydrogenase, glucose 6-phosphate dehydrogenase, non-specific esterase, and acid and alkaline phosphatases. As small and large intestinal tissue became more severely damaged, enzyme activity was generally decreased. In the colon, but not in the small intestine, reduced nicotine-adenine dinucleotide phosphate dehydrogenase was noted to translocate from a diffuse normal pattern to a luminal border pattern about the crypt and surface epithelial cells. Translocation of this dehydrogenase was most marked in specimens obtained at 8 days with a dose of 25 mg/kg of 5-fluorouracil. The translocation was also observed in 1 of 3 specimens from patients treated with 5-fluorouracil, but in none of 6 normal specimens. Translocation of this dehydrogenase in the colonic crypts and surface epithelium represents the experimental production of "the ulcerative colitis trait" and suggests that this phenomenon is not specific for ulcerative colitis. Reduced nicotine-adenine dinucleotide phosphate dehydrogenase is contained in the mitochondria and its translocation to the luminal border of the epithelial cells in animals treated with 5-fluorouracil implies a reorganization of mitochondria or mitochondrial enzymes secondary to the metabolic derangement induced by the inhibition of DNA synthesis.

8239 THE MASSIVE BOWEL RESECTION SYNDROME. TREATMENT WITH REVERSED INTESTINAL SEGMENTS. (E.) Fink, W. J. (VA Hosp., Fayetteville, Ark.) and J. D. Olson. Arch. Surg. (Chicago) 94(5):700-706, 1967.

The massive bowel resection syndrome frequently occurs when more than 200 cm (7 feet) of small intestine has been resected, and consists of diarrhea, steatorrhea, hypoproteinemia, wt. los and other nutritional disturbances. When such patients are refractory to medical treatment, they are often treated with reversed intestinal segments which slow gastrointestinal emptying time, delay transit time, allow longer food mixing and improve nutrition by increasing abso tion. The literature concerning this procedure is reviewed (8 cases were previously reported using this technic), and 4 additional cases treated in this manner are described. A 49-yr. old Caucasian male had removal of the distal 6 feet of small intestine plus resection of the lower half of the ascending colon for regional enteritis; he experienced the massive small bow resection syndrome and was treated with a 17-cm reversed loop placed between the distal small intestine and upper ascending colon, with excel results. Three other patients, a 23-yr.-old Negro male, a 66-yr.-old Caucasian male and a 65-yr.-old Caucasian female were also treated with varying degrees of reversed intestinal segments; in each case they experienced improve nutrition, reduction in the number of stools pe day and gain in wt. It is suggested that the best location for a reversed loop should be distal to the first 90 cm of jejunum.

8240 THE LYMPHATICS OF THE INTESTINAL MUCO A CLINICAL AND EXPERIMENTAL STUDY. (E.) Bank, S. (Groote Schuur Hosp., Cape Town, S. Africa), G. Fisher, I. N. Marks and A. Groll Amer. J. Dig. Dis. 12(6):619-632, 1967.

During a 3-yr. period 309 peroral jejunal biops specimens were obtained from 290 subjects. Control subjects included 77 patients in whom various diseases (53 with irritable colon, 10 with gastroduodenal ulceration, 4 each with cholelithiasis and bronchiectasis, 5 with dermatitis and 1 with Ladd's syndrome) did not have any bearing on the state of intestinal lymphatics. The patient group included 232 wit various other diseases (109 specimens from patients with small intestinal disease; 34 from those with pancreatic disease; 32, gastric surg 8, ulcerative colitis; 6, hepatic cirrhosis; 4, gross gastric hypersecretion; 4, gastrointestin tract carcinoma; 14, pernicious or iron-deficie anemia; 14, congestive cardiac failure; 4, an established collagen disease and 3 with a nephrotic syndrome). The biopsy specimens were reviewed with regard to the frequency with whic mucosal lymphatic channels were visualized on routine microscopy, and an attempt was made to measure their approx. size. Distinct lymphatic channels were seen in 1 or more villi in 114 of 309 specimens at magnifications of 100 times an 40 times. In order to be certain of abnormal mucosal lymphatic dilatation, it was thought th the lymphatics should be greater than normal size and should be present in several villi.

3 patients exceeded the normal range; the
natic block appeared to be at a lymph-gland
in 2 and at a level of the muscle layer
ne intestine in 1. It is suggested that
tron microscopy and multiple biopsy specimens
necessary to be certain of lesser degrees of
natic dilatation, especially those less than
in diameter. Attempts to produce lymphangi-
sia experimentally in the dog (i.e., to
ent the size or the number of mucosal lympha-
, with forced fat feeding, high or low thoracic
ligation, or regional lymphatic blockage for
ods up to 6 mo.) were successful. The
ible reasons for the occurrence of protein-
ng enteropathy without lymphangiectasia
presented, and the difficulties in differ-
ating lymphatics from empty blood vessels
villous edema are discussed.

AN ULTRASTRUCTURAL STUDY OF THE SMALL INTESTINE AFTER TOTAL VAGOTOMY. (E.)
ott, R. L. (U. Mississippi Med. Ctr.,
son), W. O. Barnett and M. C. Elliott. Surg.
c. Obstet. 124(5):1037-1042, 1967.

sy specimens of the jejunal mucosa were ob-
ned before vagal denervation and at intervals
, 2, 4, and 6 wk. as well as at 3, 4, 6 and
no. after vagotomy in 12 adult mongrel dogs;
pleteness of vagotomy was determined by the
ervation of a specimen taken from the interposed
of ileum between the stomach and duodenum.
sue was prepared for electron microscopy and
edded in Epon-812. Sections, 1 μ thick, were
mined with the phase microscope to determine
site to be examined further by electron
roscopy, and ultrathin sections were examined
the latter method. The villi of the jejunal
osa maintained their anatomic integrity
oughout the period of study. Comparative
dies (electron microscope) failed to reveal
changes in ultrastructural components of the
unal mucosa after vagotomy. Microvilli,
ochondria, endoplasmic reticulum, Golgi appara-
and the terminal web area all remained
mal. It is concluded that ultrastructural
ponents of the jejunal mucosa maintained their
mal morphologic integrity for a period of
m 1 wk.-1 yr. after vagotomy.

2 GASTRIC EVACUATION AND PROPULSIVE INTESTINAL MOTILITY FOLLOWING RESECTION
THE SMALL INTESTINE IN THE RAT. (E.) Nylander,
(Acad. Hosp., Uppsala, Sweden). Acta Chir.
nd. 133(2):131-138, 1967.

a series of 211 rats, divided into a high
ection group of 60 rats, a low resection group
60, and a control group of 91, propulsive in-
stinal motility was studied following resection
the proximal jejunum, and of the distal ileum.
was inferred that the altered propulsive motil-
y in the resection groups (demonstrated by the
stribution of the radioactive test dose in the
omach and intestine at the given experimental
junctures) is due to dynamic factors, not to a mechanical one. Also, displacement of a radioactive dose towards the site of the intestinal resection, i.e., proximally when a proximal, and distally when a distal, segment of the small intestine is removed, led to the assumption that a differentiated propulsive function may exist in the small intestine, the autonomy of which belongs to each consecutive part of the intestinal tract. The eliminated function is anatomically related to the resected portion. Further experiments are suggested to elucidate this hypothesis.

8243 RESECTION OF THE SMALL INTESTINE IN RATS. III. MORPHOLOGICAL CHANGES IN THE INTESTINAL TRACT. (E.) Nygaard, K. (State Hosp., Oslo). Acta Chir. Scand. 133(3):233-248, 1967.

Morphological studies of the alimentary canal of 117 female rats were carried out following resection of various lengths and different parts of the small intestine. The types of operations performed (and in parentheses the number of rats) were: sham (14); jejunal (8) and ileal (8) transections; resections of the proximal 25% (10), third 25% (7), middle 50% (7), proximal 75% (31) and distal 75% (21); bypass proximal 75% end-to-side anastomosis (7); bypass middle 50% side-to-side anastomosis (4). The results indicate that various processes contribute to the structural changes in the alimentary tract after the resections; these processes were: atrophy; 2 kinds of hypertrophy (local and diffuse) involving all layers of the intestinal wall. Postoperative resemblance between the pattern of epithelial surface regeneration and the adaptation of absorption was evident. The colon increased in wt., length and circumference after large distal resections of the small intestine. Bypassing caused anatomical changes similar to those seen after resection. Intraoperative measurement of the small intestine, and preservation of its anatomy when it is removed and measured postoperatively, was emphasized.

8244 SEGMENTAL INFARCTS OF THE SMALL INTESTINE AND MESENTERIC ADENITIS IN THAI CHILDREN. (E.) Headington, J. T. (Chiengmai U. Sch. Med., Thailand), S. Sathornsumathi, S. Simark and W. Sujatanond. Lancet 1(7494): 802-806, 1967.

Clinical, laboratory, radiologic and pathologic findings are described in 5 Northern Thai children (4 boys, 1 girl; aged 4-7 yr.) with gangrenous segmental infarcts of the small intestine associated with mesenteric adenitis and marked reactive hyperplasia of the mesenteric lymph nodes. Two of 5 died of irreversible shock and paralytic ileus, before surgical intervention could be undertaken. Characteristic presenting symptoms included vomiting and acute, febrile diarrhea, characterized by brownish, watery stools without gross blood or mucus but strongly positive for occult blood. Paralytic ileus developed within 48-72 hr. after the onset of symptoms, accompanied by serous ascites and followed by severe shock which quickly became irreversible. X-ray at this time showed dilatation and gas-filled loops of small intestine, accompanied by significant thickening of the wall of the involved segments, reduction of the caliber of their lumens and the appearance of fixation. The condition is said to occur in young children, most frequently in boys, and note is made that all of the patients reported were hospitalized at, or shortly after, the end of the rainy season. Initial treatment was symptomatic, including replacement of electrolytes, and was followed, in 3 of 5 who lived to laparotomy, by resection of the affected segment or segments of small intestine.

8245 PROGRESSIVE VILLOUS ATROPHY OF THE ILEUM USED AS A URINARY CONDUIT. (E.) Goldstein, M. J. (Mem. Hosp. Cancer Allied Dis., New York, N. Y.), M. R. Melamed, H. Grabstald and P. Sherlock. Gastroenterology 52(5):859-864, 1967.

Patients (15 men, 7 women, 36-82 yr.) with pathological diagnosis, prior to cystectomy and ileal conduit construction, of epidermoid or transitional cell carcinoma of the bladder (20), "bladder tumor" (1), papillomatosis of entire bladder (1) were studied. Twenty received irradiation of the bladder (tumor doses, 3000-6000 r) prior to conduit construction; interval between construction and biopsy was 7 days-5.5 yr. Suction biopsies of ileal bladder (24) were obtained from all 22; specimens of normal ileum were obtained from 2 during conduit construction. Biopsies were obtained with the Woods tube; the capsule was inserted approx. 5 cm beyond the mucocutaneous margin of the stoma. Specimens were immediately removed from the capsule, oriented on heavy blotting paper, fixed in 10% neutral formalin, serially sectioned, stained with hematoxylin, eosin, mucicarmine, periodic acid-Schiff and observed by 1 person without knowledge of conduit-biopsy interval. Progressive villous atrophy was observed, beginning as early as 1 wk., with considerable individual variation in rate and degree. The changes ranged from mild-to-moderate villous, mucosal and submucosal edema with consequent broadening, blunting and apparent shortening of villi within the first few mo. The change was patchy or irregular and interspersed with areas of relatively normal or mildly edematous villi. For the next few mo. there was progressive shortening of the villi with partial replacement by deeper crypt formation. Blunting and broadening of villi progressed to loss of villous structure and flattening of mucosa. The rate of loss of villous structure varied among individuals but was usually complete by 2 yr. No consistent change was observed in the number of goblet cells or Paneth cells. Mild inflammatory infiltrate in the lamina propria was found in a few cases, and was not correlated with operation-biopsy interval.

8246 CORRELATION OF JEJUNAL FUNCTION AND MORPHOLOGY IN PATIENTS WITH ACUTE AN CHRONIC DIARRHEA IN EAST PAKISTAN. (E.) Kent, T. H. (Walter Reed Army Inst. Res., Washington, D. C.) and J. Lindenbaum. Gastroenterology 52(6):972-984, 1967.

A total of 225 jejunal mucosal biopsy specimens were obtained from 81 subjects in East Pakista these included 7 normal Pakistanis, 16 America in Pakistan (14 of whom were Peace Corps volunteers), 12 subjects with cholera, 30 with acute diarrhea other than cholera (2 with noncholera vibrio infection, 2 with nonvibrio cholera, 2 with typhoid fever, 2 with shigellosis, 1 with dysentery of unknown cause, 1 with staphylococ food poisoning, and 20 with acute selflimited diarrheal illnesses unassociated with recognize pathogens on stool culture), 13 patients with chronic diarrhea with malabsorption (2 of whom had undergone gastrectomy, 1 had amebiasis and 1 had chronic liver disease), and 3 with chroni diarrhea without malabsorption. Ten of 81 were treated for 2-14 wk. with p.o. tetracycline (1 or 2 g daily). Biopsies were graded accordi to severity of morphological alteration under t dissecting microscope and on histological secti Jejunal lesions were similar in character in patients with acute diarrheal illnesses, chroni malabsorption syndromes and in normal controls, but there were differences in severity of damag Jejunitis was most severe during or shortly aft an acute diarrheal episode or in those patients with chronic malabsorption of unknown cause (tropical sprue). Severity of the lesions decreased after recovery from acute diarrhea and some patients with chronic malabsorption treate with tetracycline. The extent of mucosal damag correlated moderately well with xylose absorpti less well with fat absorption and least well with vitamin B_{12} absorption. Absorptive functi correlated better with the histological appeara of the jejunal mucosa than with the architectur patterns seen under the dissecting microscope.

8247 CARCINOID-ISLET CELL TUMORS OF THE DUODENUM. (E.) Weichert, R. (Tulane U. Sch. Med., New Orleans, La.), R. Reed and O. Creech, Jr. Ann. Surg. 165(5):660-669, 1967.

Sixteen cases (8 males, 8 females) of carcinoid islet cell tumors of the duodenum are described there were 10 patients with ulcer and 6 without ulcer. Of 6 without duodenal ulcer, 3 were asymptomatic and the tumors were found at autop the other 3 patients had vague abdominal compla or epigastric cramping pain suggestive of intermittent duodenal obstruction. In 10 patients with ulcerogenic tumors, symptoms varied from those of uncomplicated duodenal ulcer to those suggestive of Zollinger-Ellison syndrome. Duration of symptoms ranged from a few days to 15 y Vomiting was severe in 3 patients and was accompanied by severe diarrhea in 1; each of these later proved to have the Zollinger-Ellison syndrome. Radiologic examination of the upper

intestinal tract and gastric analysis were
st helpful aids in diagnosis. The gastro-
inal series showed abnormalities in 12 of
ients examined. Gastric analyses were done
f 10 patients with ulcers; 5 with hyper-
ion were classified as having the Zollinger-
n syndrome. Thirteen patients with duodenal
were operated on; in 10, surgery was done
mptoms of ulcer and in 3 for removal of
s seen on radiology. All those without
ecretion remained well after operation.
6 with Zollinger-Ellison syndrome obtained
ete relief of symptoms after removal of a
tumor and part of the stomach. Of 3 with
ant tumors who required total gastrectomy,
survived. A sixth patient remained
matic after 2 partial gastrectomies.
arity in microscopic appearance did not allow
nction of carcinoid from islet cell tumors.
proposed that carcinoid and islet cell
s share a common origin in the argentaffin
based upon the following reasoning.
logically, the tumors are indistinguishable.
rgentaffin cell, thought to be the parent
of carcinoid tumors, can be traced embryo-
ally to the islets of Langerhans. Function-
arcinoid and islet cell tumors have been
in the stomach, duodenum, pancreas, liver
ronchi; and argentaffin cells are present
ese derivatives of the foregut. Pancreatic
cell tumors and metastatic tumors resembling
noid and islet cell tumors produce insulin.
eatic and duodenal islet cell tumors produce
in and the Zollinger-Ellison syndrome.
eatic ductal, acinar, and islet cell tumors
ce serotonin and the carcinoid syndrome.
rine of one patient with an ulcerogenic tumor
e duodenum contained 5-hydroxyindole acetic
Carcinoids of the foregut are associated
increased incidence of gastrointestinal
rs.

SMALL-BOWEL ULCERATION DUE TO ENTERIC-
COATED POTASSIUM INGESTION IN A TWO-
-OLD CHILD. (E.) Hartman, S. W. (St. Joseph
., Burbank, Calif.), E. M. Greaney, Jr. and
ottapel. Surgery 61(5):814-815, 1967.

SMALL INTESTINE ULCERS WHICH POSE A
PROBLEM. (Fr.) Stelzner, F. (U.
urg-Eppendorf, Germany). Scalpel 120(10):
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MATERNAL DEATHS INVOLVING PARALYTIC
ILEUS. (E.) (Ed.) Ohio Med. J.
):805-807, 1967.

BILIARY ILEUS. (It.) Puntillo, F.
(Riuniti Hosp., Rome) and C. Fani.
Ital. Chir. 307-333, 1966.

2 REVISIONAL JEJUNAL TRANSPOSITION. (E.)
Kay, A. W. (U. Glasgow, Scotland).
ch (Johannesburg) 36(4):102-105, 1966.

8253 SURGERY OF THE DUODENUM IN INFANTS AND CHILDREN. (Ger.) Wurnig, P. (Mautner-Markhof Child. Hosp., Vienna). Klin. Med. (Wien) 22(4):168-177, 1967.

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8255 AMPUTATIONS OF THE INTESTINE. SURVIVAL AFTER EXTENSIVE RESECTIONS. (Fr.) Delagarde, P. (Tenon Hosp., Paris), F. Magnier and M. Meunier. Ann. Chir. 21(5-6):289-294, 1967.

8256 PEDIATRIC AND SURGICAL PROBLEMS IN SUBTOTAL SMALL INTESTINE RESECTION IN NEONATES. (Ger.) Helmer, F. (U. Clin., Vienna) and A. Rosenkranz. Paediat. Paediol. (Wien) 3(1):72-85, 1967.

8257 HEMODYNAMIC CHANGES UNDER THE EFFECT OF TRANSFUSIONS OF LOW MOLECULAR POLYVINYLPYRROLIDONE (PVP-N) IN ACUTE EXPERIMENTAL OBSTRUCTION OF THE SMALL INTESTINE. (Rus.) Sirotenko, A. V. (Cent. Inst. Hemat. Blood Trans., Moscow). Probl. Gemat. 12(6):16-21, 1967.

8258 REMOTE RESULTS OF PERIMURAL AND TRANS-MESENTERIC INTESTINAL PLICATION IN ADHESIVE INTESTINAL OBSTRUCTION. (Rus.) Belyi, I. S. (Dnepropetrovsk Med. Inst., USSR). Klin. Khir. (Kiev) (6):40-43, 1967.

8259 CONGENITAL DUODENAL OBSTRUCTION: REVIEW OF 29 CASES ENCOUNTERED IN A 30-YEAR PERIOD. (E.) Longo, M. F. (Mayo Clin., Rochester, Minn.) and H. B. Lynn. Mayo Clin. Proc. 42(7): 423-430, 1 67.

8260 MORPHOLOGICAL CHANGES IN A INTESTINAL ANASTOMOSIS BY AN ADHESIVE TECHNIC. (Rus.) Vishnevskii, A. A., Jr. (Vishnev Inst. Surg., Moscow). Eksp. Khir. Anest. 12(3):37-39, 1967.

8261 MECHANICAL OBSTRUCTIONS OF THE SMALL INTESTINE BY ADHESIONS, DIAPHRAGMS, INTERNAL STRANGULATIONS AND VOLVULUS. (Fr.) Falise, P. (Surg. Inst., Chimay, Belgium). Acta Chir. Belg. 65(9):985-1015, 1966.

8262 PROPHYLAXIS OF EXPERIMENTAL INTESTINAL ADHESION BY LOW MOLECULAR DEXTRAN. (Jap.) Sakakinhara, Y. (Tokushima U. Sch. Med., Japan), N. Ogasa and T. Sato. Arch. Jap. Chir. 36(3):326-333, 1967.

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8264 CARCINOMA OF THE JEJUNO-ILEUM. (E.) Mech, K. F. (St. Agnes Hosp., Baltimore, Md.). Amer. Surg. 33(4):330-333, 1967.

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8268 DUODENAL DIVERTICULI. (Rum.) Adam, E. (2nd Adult Hosp. Clin., Timisoara, Rumania), V. Udroiu, C. Nica, P. Bolchis, E. Geac and A. Popescu. Med. Intern. (Bucur.) 19(5):631-635, 1967.

8269 FIVE CASES OF STENOSING TUBERCULOSIS OF THE SMALL INTESTINE. (Fr.) Moulin, F. (Cent. Hosp., Hue, Vietnam). Bull. Soc. Chir. Paris 57(2):102-111, 1967.

8270 CICATRICIAL STENOSIS OF THE SMALL INTESTINE AFTER CONTUSION OF THE ABDOMEN. (Fr.) Gillet, M. (U. Strasbourg, France), E. Philippe and M. Adloff. J. Chir. (Paris) 93(4):469-477, 1967.

8271 CONGENITAL DUODENAL STENOSIS PRODUCI MEGADUODENUM IN A NINETEEN YEAR OLD MONGOLOID. (E.) Chandler, N. W. (Emory U. Sc Med., Atlanta, Ga.) and B. B. Gay, Jr. Amer. Roentgen. 100(1):113-116, 1967.

8272 CONGENITAL DUODENAL DIAPHRAGM IN THE ADULT: REVIEW OF THE LITERATURE AND REPORT OF A CASE. (E.) Smiley, K. (U. Texas Southwestern Med. Sch., Dallas), M. Perry and R. McClelland. Ann. Surg. 165(4):632-636, 1967

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8274 LAPAROSCOPIC STUDY OF SMALL INTESTINE LYMPHATICS. (Fr.) Debray, C. (Bicha Hosp., Paris), J. A. Paolaggi and B. Mugnier. Sem. Hop. Paris 43(29):1909-1910, 1967.

8275 ISOLATED CONTRAST VISUALIZATION OF TH DUODENUM IN ANTRENYL HYPOTENSION. (Ger.) Moldenhauer, W. (U. Rostock, Germany), W. Kröger and J. Schultz. Roentgenpraxis 20(5) 101-110, 1967.

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EFFECTS OF GASTRIC SURGERY UPON GASTRIC EMPTYING IN CASES OF PEPTIC ULCERATION. Buckler, K. G. (Royal Infirm., Bristol, and). Gut 8(2):137-147, 1967.

ric emptying times in excess of 6 hr. were in only 16 of 130 normal subjects under 60 of age (including 4 of 32 who were under in 4 of 10 aged 61-70 and in 1 of 10 aged r over. Emptying times of 2 hr. or less seen in only 3 of 130, 2 of 10 and 0 of 10, . Emptying times of less than 2 hr., 2-4 hr., hr., 6-8 hr. and more than 8 hr. were lated for 12 patients with hiatal hernia, as ows: 2, 3, 4, 2 and 1, resp. (with prolonga- only in the presence of associated ulcer); 24 with pernicious anemia, they were 12, 9, and 0, resp. (with increased speed ciated with achlorhydria); for 193 with enal ulcer, they were 4, 59, 72, 41 and 17, . (with prolongation associated with very ed hypersecretion); for 83 with benign ric ulcer, they were 3, 19, 31, 24 and 6, . (with prolongation only in the presence of ss scarring of the lesser curvature); for 14 gastric carcinoma, they were 0, 2, 2, 1 and resp. Comparable tabulations for gastrectomized ients with a Polya anastomosis (45 cases) e 11, 26, 7, 1 and 0, resp.; with a Billroth nastomosis (41), they were 2, 18, 17, 4 and 0, p. Following pyloroplasty or pylorectomy (8), y were 1, 0, 3, 3 and 1, resp.; following troenterostomy (9), they were 0, 4, 4, 1 and resp.; following vagotomy alone (15), they e 0, 0, 0, 6 and 9, resp. When additional otomized patients were grouped in terms of ociated surgical technics, they were as lows: Polya (22) = 2, 6, 4, 4 and 6, resp.; lroth I (27) = 0, 4, 3, 5 and 15, resp.; oroplasty (35) = 0, 0, 4, 11 and 20, resp.; troenterostomy (37) = 0, 3, 8, 22 and 4, resp. is concluded that there is no evidence that tric stasis is associated with either gastric duodenal ulceration, although it may company gastric cancer; that gastric emptying speeded after gastric resection or bypassing e duodenal circuit; that vagotomy, with or thout drainage, delays gastric emptying gnificantly.

8 ROLE OF CALCIUM IN GASTRIC HYPER- SECRETION, PARATHYROID ADENOMA AND PTIC ULCER. (E.) Barreras, R. F. (U. sconsin Med. Sch., Madison) and R. M. naldson, Jr. New Eng. J. Med. 276(20): 22-1124, 1967.

a 37-yr.-old woman with 3 parathyroid enomas, duodenal ulcer, hypercalcemia and rked gastric hypersecretion, parathyroidectomy d to restoration of normal serum Ca levels, companied by a reduction of gastric secretion normal levels. Ca admin. was terminated 6 . after surgery. Subsequent induction of hypercalcemia on several occasions was always associated with a rise of gastric secretion to the preoperative levels. Preoperative serum Ca was 12.6 mg/100 ml and the basal acid output was 19.1-20.1 mEq/hr. During the first postoperative yr., these values were reduced to 9.6 mg/100 ml and 2.1 mEq/hr., resp. Preoperative peak acid output had been 57.6 mEq/hr. Response to betazole hydrochloride declined to 45.6 mEq/hr. 1 wk. postoperatively; then decreased progressively to 24.5 mEq/hr. 1 yr. later. It is suggested that a gastric secretory response to calcemia may account for peptic ulcer in some hyperparathyroid patients.

8279 PARIETAL-CELL ANTIBODIES IN PATIENTS WITH DUODENAL ULCER AND GASTRIC CANCER. (E.) Kravetz, R. E. (Yale U. Sch. Med., New Haven, Conn.), S. Van Noorden and H. M. Spiro. Lancet 1(7484):235-237, 1967.

The presence of parietal cell antibodies was sought in 398 patients with duodenal or gastric ulcer. The patients were classified into 6 groups containing 131, 42, 79, 17, 50, and 67 patients. Of the 131 control patients without gastrointestinal, diabetes or thyroid history, no correlation between age and the presence of antibodies was found (13% of the 131 without diabetes, and 42% with it had circulating parietal cell antibodies). Of the 42 (with pernicious anemia), antibodies occurred in 83%, with no correlation between duration of disease and antibodies. Of the 17 (with gastric ulcer), 17% had antibodies. Of the 50 (with history of subtotal gastrectomy), 40 had duodenal ulcer and 8 had gastric ulcer with 1 case among the 40 with parietal cell antibodies. Of the 67 (with gastric carcinoma), 9% had parietal cell antibodies. The Coons and Kaplan gastric antibody technic, gastric mucosal biopsy, and enzyme histochemistry were the technics employed for the study. It is concluded that parietal cell antibodies are most often found in patients with pernicious anemia. Duodenal ulcer patients as a group are less likely to show these antibodies after subtotal gastrectomy, when gastritis is expected. The incidence of parietal cell antibodies is low in patients with gastritis of gastric carcinoma. It appeared that parietal cell antibodies and gastritis may be independent characteristics, related in some individuals; parietal cell antibodies may form as a result of gastritis only in patients genetically inclined.

8280 LIBIDO CHANGES IN DUODENAL ULCER PATIENTS. (Ser.) Josimović, I. (Gen. Hosp., Bijeljina, Yugoslavia). Srpski Arh. Celok. Lek. 94(6):587-596, 1966.

A study was made on 100 duodenal ulcer patients who were medically treated (with drugs) and 20 who underwent gastric resection; all were males, 21-50 yr. old. All other sources for changes of libido were excluded. After the onset of disease, 49 of 100 patients treated medically exhibited changes in libido; in 30% it was decreased (1 coitus every 15-30 days), in 10% it was very diminished (1 coitus every 5 wk.-4 mo.), 3% were impotent, but in 6% the libido increased (2-3 coituses/day). After gastrectomy, 14 of 20 subjects had a decreased frequency of coitus, which had decreased before surgery in 11 of 14, and continued to decrease further after surgery. Four subjects were unable to work; the remaining 6 subjects had a normal libido before and after surgery, and their working ability was unimpaired. The duration of ulcer disease, age and nutritional condition of the patients had no essential influence on the changes of libido. Patients who lived and worked in cities had markedly greater changes in libido than did those from a rural, agricultural population. Libido changes were more pronounced in neurotic individuals than in emotionally stable patients. A normal libido was found among 33.3-50% of the office workers and qualified and unqualified manual laborers, and among 60% of the farmers; a normal libido was found among 26.8% of the neurotic individuals and among 64.8% of those considered stable. Among the latter farming was the principal occupation, and office workers were found least frequently in this group. The situation was reversed among those considered to be neurotic. In addition to endocrine dysfunction, changes in libido among duodenal ulcer patients are most likely to be explained by a neurotic inhibition of the normal expression of sexuality. The condition of the libido may serve as a guide for the ability of patients to tolerate surgery, i.e, if a patient had a normal libido before surgery, the latter will probably be well tolerated; however, if a patient's libido was diminished prior to surgery, it will continue to decrease after surgery; the latter will be poorly tolerated, and invalidism may possibly develop due to inability to work.

8281 GASTRIC MUCOSAL COATING AND GASTRIC EMPTYING TIME OF ANTACIDS. A GASTROCAMERA STUDY. (E.) Morrissey, J. F. (U. Wisconsin Sch. Med., Madison), T. Honda, Y. Tanaka and G. Perna. Arch. Intern. Med. (Chicago) 119(5):510-517, 1967.

The rate of emptying and the mucosal coating properties of 4 antacids (nonreactive aluminim hydroxide and magnesium trisilicate, magnesium-aluminum hydroxide, magnesium-aluminum hydroxide and simethicone, and $CaCO_3$ powder) were studied in normal volunteers (21-45 yr. old) and in patients with gastric ulcers by the technic of intragastric photography using the GT-5 gastrocamera. The antacids distributed themselves within the stomach largely by gravity with only slight adherence to the mucosal surface. The majority of subjects had only minimal amounts of antacid present 1 hr. after admin., most of which coated the distal posterior wall of the antrum. There were no differences between normal volunteers and patients with gastric ulcers and no differences between the antacids tested. Gastric ulcers tended to mechanically trap antacid but otherwise showed little, if any, specific affinity for the antacid tested. Smal doses of antacid (8-10 ml) were emptied more rapidly than larger doses (30 ml) by most, but not all, subjects. Duration of the presence o antacid was greatly prolonged by the prior admin. of atropine. Bubbling within the stomac sufficient to affect antacid distribution was never observed. The results of this study support the recommendation that fasting peptic ulcer patients should receive a dose of an antacid every hr. It is possible that the frequency of antacid admin. can be reduced by the concomitant admin. of an anticholinergic drug.

8282 IN SITU pH OF DUODENAL BULB CONTENTS I NORMAL AND DUODENAL ULCER SUBJECTS. (E.) Archambault, A. P. (Mayo Clinic, Rocheste Minn.), R. A. Rovelstad and H. C. Carlson. Gastroenterology 52(6):940-947, 1967.

The pH of duodenal bulb contents was recorded with a guarded, in situ, glass electrode in 75 subjects, 16 of whom had duodenal ulcer; none of the patients had received anticholinergic drugs for at least 2 wk. before being studied. The antrocutaneous and duodenocutaneous potenti differences were simultaneously recorded from flowing KCl bridges attached to the glass electrode lead, and potential difference patterns were used to position the glass electrode and to monitor its location. Simultaneous cinefluorography confirmed that a potential difference between duodenum and gastric antrum of greater than 15 mvolt (with duodenum more positive) was a reliable sign tha the glass electrode was in the duodenal bulb. In both normal and ulcer subjects the mean duodenal bulb pH was significantly greater than antral pH. In ulcer patients, the mean duodena bulb pH (2.9) was significantly lower than norm (4.5). Both normal and ulcer antral pH values were similar (1.7). There was no significant difference between ulcer and control groups wit respect to the pH of antral or postbulbar duodenal contents. Duodenal bulbar pH was much less stable than antral pH. Postbulbar duodena pH was higher and more stable than the pH of th duodenal bulb.

8283 TREATMENT OF PEPTIC ULCER WITH LOW-POTASSIUM DIET. (Pol.) Bojanowicz, K (Inst. Intern. Dis., Acad. Med., Lodz, Poland). Pol. Tyg. Lek. 21(45):1721-1726, 1966.

The author reviews his own work and the pertine literature concerning the experimental basis of the so-called low-K diet in the treatment of peptic ulcers. This is followed by a discussio of the composition of the low-K diet, its effec my, method of admin., comparison with other ne diets, the results of treatment and the diet in gastric or duodenal hemorrhage. therapy of active peptic ulcer should follow ollowing sequence: the initial diet: 110 g ins, 125 g fats, 430 g carbohydrate and of K for a total of 3380 calories; 2) trans- al diet A: 110 g proteins, 120 g fats, carbohydrates and 2.8 g K for a total of calories; 3) transitional diet B, 105 g pro- , 105 g fats, 330 g carbohydrates and 3 g of a total of 2685 calories and, finally, 4) ermanent diet, consisting of 105 g proteins, fats, 320 g carbohydrates and 3 g K for a of 2600 calories. Such a dietary regimen us low in K and rich in calories, proteins, and carbohydrates, as well as containing ins A, B, C and D, Ca, P, Fe, cholesterol Cl. The meals are frequent but small in vol. regimen is suitable to the dynamics of peptic disease and is better tolerated and yields er results than other routine methods, as nstrated by results of the author's long-term ies on more than 600 patients treated under ical or outpatient conditions.

SIDE EFFECTS OF CARBENOXOLONE SODIUM: A STUDY OF AMBULANT THERAPY OF GASTRIC

R. (E.) Montgomery, R. D. (East Birmingham ., England). Gut 8(2):148-150, 1967.

enoxolone sodium was admin. to 50 outpatients gastric ulcer (50 mg 3 times a day for 6 If the ulcers failed to heal, the dose was ated for another 6 wk. Sixty percent of all ents were symptom-free in 12 wk. Side cts were observed in only 3 of the fifty ents. These patients, who were over 60 and were hypertensives, exhibited ankle edema, taxis, and a rise of diastolic pressure of m Hg or more. One of the 3 patients loped congestive heart failure and died 10 after discontinuing the drug. In the ining 47 patients, the trend for the blood sure was upward; the mean change in the e series was + 7 mm systolic and + 4 mm tolic; the mean serum K level in 32 cases at end of treatment was 4.1 mEq/liter, and the fall in 18 subjects was 0.3 mEq/liter. No ious loss of K was found. It is concluded t Carbenoxolone sodium in the dosage of mg/day is a safe drug in patients in the ence of hypertension, chronic cardiac, renal hepatic disease, and it should not be given conjunction with steroid therapy. The short- m effect on the ulcer niche of this drug ms to be encouraging, although the therapeutic ue in this dosage has yet to be proved.

5 DIFFERENT SURGICAL THERAPIES IN IDENTICAL TWINS WITH DUODENAL ULCERS.

) Lawton, R. L. (U. Iowa, Iowa City), E. S. ntnall and R. M. Freeman. Gastroenterology 4):709-712, 1967.

h twins presented with a perforated duodenal er 1 yr. apart; metabolic studies were carried out simultaneously on both, well after operation. In the first (1; duodenal ulcer with a partial pyloric obstruction), a Hofmeister type partial gastrectomy (distal 2/3 resected) with a retrocolic gastrojejunostomy was performed; an incidental operative finding was cholelithiasis with an uninflamed gallbladder, which was removed; he received 1500 ml transfused blood during the operation. In the second (2), a perforated (sealed-off) duodenal ulcer was found and closed; 1 mo. later a transabdominal vagotomy and pyloroplasty (Heineke-Mikulicz type) was performed; an incidental operative finding was cholelithiasis with an uninflamed gallbladder; the gallbladder was removed; no blood was given. The first died of coronary thrombosis after 5 yr.; (2) is alive after 10 yr. They were studied in a metabolic ward on 4 occasions over 2 yr. Daily fecal fat excretion of (1) was twice that of (2) during the first 3 periods; during the fourth, fecal fat excretion of (2) was less than 10% of intake, while (1) excreted 24% of ingested fat. Fecal fat excretion of (2) was at the upper limits of normal; that in (1) was grossly abnormal on all 3 occasions. Both were in positive nitrogen balance on each occasion, and differences were less striking. This may have been secondary to poor dietary intake prior to hospitalization. Both showed substantial wt. gain. The results confirm the hypothesis that gastrectomy, when compared with vagotomy, is associated with a significant increased fecal fat loss.

8286 RECURRENT UPPER GASTROINTESTINAL HEMORRHAGE IN PEPTIC ULCER. (E.)

Borland, J. L., Sr. (1661 Riverside Ave., Jacksonville, Fla.), W. R. Hancock and J. L. Borland, Jr. Gastroenterology 52(4):631-637, 1967.

In a 10-yr. study of gastrointestinal hemorrhage, all those with hiatal hernia, esophageal or gastric varices, cirrhosis, malignant diseases, telangiectasia, and blood dyscrasia were excluded; only those with hematemesis or tarry stools on admission, symptoms of peptic ulcer, and/or X-ray or pathological evidence of ulcer were included. Of 456 patients, 283 were followed for 1 yr. or longer; 257 for 2; 131 for 5; 25 for 10. Of 173 followed for less than 1 yr., 23 died with the initial hemorrhage; 150 were lost to follow-up. Overall mortality was 5% (23 of 56). Among 105 patients experiencing 173 recurrent episodes of bleeding, only 2 deaths occurred (1.9%). There was a gradual increase in mortality with increasing age at initial hemorrhage; the percentage of patients under 50 yr. dying of initial hemorrhage was not significantly different from that of those 50-79 yr.; the difference was significant when those over 80 yr. were included. Those who required 3 U of blood or less in the initial hemorrhage had a 2.7% mortality; 4-6 U, 4%; 7-9, 16.1%; 10 or more, 26%. There was a significant difference between those requiring less than 6 U blood and those requiring more. Age did not significantly affect the chance of having 1 or more recurrences for patients followed for 3, 5, and 7 yr.; the overall chance of recurrence depended partly on the length of follow-up. Age at initial hemorrhage had no substantial effect on the severity of the first recurrence. Severity of recurrent hemorrhage did not depend on severity of initial hemorrhage. There was no substantial effect on the severity of recurrent hemorrhage relative to the number of transfusions required at the initial hemorrhage.

8287 AN EVALUATION AND COMPARISON OF THE EARLY AND LATE RESULTS OF STANDARDIZED POLYA GASTRECTOMY.

(E.) Kemp, D. (West Middlesex Hosp., Isleworth, England). Gut 8(2): 151-165, 1967.

A comparison of results of 370 Polya-type gastrectomies divided in 2 groups was made; the early group (1950-1951) included 120 cases, the later group (1959-1963) 250 cases. The overall operative mortality was less than 0.3%. The male:female ratio was 3.9:1, but above the age of 40 yr. the ratio decreased in both groups. The ulcer pathology was constant in both groups; gastric ulcers accounted for 30% and duodenal ulcers for 70%. Gastric ulcers were more pronounced in the females of both groups. There was a high incidence of nausea, fullness and dumping in the 1950-1951 group females; for the early and late groups the dumping syndrome incidence was 5.8% and 5.5%, resp., while, 32% and 21%, resp., experienced postoperative nausea, fullness, vomiting, diarrhea, recurrent ulceration and bleeding. The recurrent ulcer rate was 1.3%; there were 5 cases of melena and hematemesis, of which 3 patients gave a history of aspirin ingestion. Wt. loss in each group was approx. 10%, the majority of the patients gaining or maintaining their own wt. There was a high incidence of anemia in all categories except for the 1959-1963 males; 36% of males over 45 and 20% of males under 45 were anemic in the 1950-1951 group. Of premenopausal females in the 1959-1963 group, 50% were anemic, while there was 69% of females over 45 that proved to be anemic. The incidence of vitamin B_{12} deficiency was 14% at 16 yr. after gastrectomy, but only 3 cases had values below 140 pg/ml. Duodenal ulcer patients had a mean value of 349 pg/ml and gastric ulcer patients had 255 pg/ml compared with the mean for normal subjects of 472 pg/ml.

8288 ANASTOMOTIC ULCERS.

(E.) Andros, G. (Massachusetts Gen. Hosp., Boston), G. A. Donaldson, S. E. Hedberg and C. E. Welch. Ann. Surg. 165(6):955-966, 1967.

Over a 50-yr. period at the Massachusetts General Hospital, 326 cases of clinically diagnosed anastomotic ulcer were found; 263 (81%) were in men and 63 (19%) in women. The ulcers were located in the duodenum in approx. 98% of the cases, and in the stomach in 2%. Review o the type of operation performed before development of anastomotic ulcer showed that 178 (55% had posterior gastroenterostomy alone, and 124 (40%) had gastric resection. A total of 87 (2 were treated medically, but operations for marginal ulcers were performed on 239 (73%) of the patients; of these, 23 required a second operation for second anastomotic ulcers. In t entire series, there were 16 deaths; but in th period 1947-1966, operative mortality was only 3%. Follow-up studies of 5 or more yr. durati were carried out on 145 patients. Excellent o good results were found in 104 (72%) of 145 patients after 5 yr.; 11 (7%) had fair results and poor results were found in 30 (21%); of th latter, poor results were due to recurrent ulcers in 26, hemorrhage in 3 and severe malnutrition in 1. Of the 26 with recurrent ulcer, 17 had a second operation and 1 had 2 operations to relieve the ulcer; 13 (9%) of th total were converted to excellent results by this secondary operation in the follow-up peri of 5 yr. or more after the second operation. No specific operation was immune to poor resul When the primary operation was a posterior gastroenterostomy, an adequate gastric resecti plus vagotomy gave the best results. If the previous operation was an inadequate gastric resection, a higher gastrectomy plus excision retained antral tissue was necessary in additi to vagotomy. In this series, 2% of the patien eventually required total gastrectomy for control of the ulcer. Finally, it is suggested that increased use of the gastroscope will lea to a more accurate differentiation of gastriti and gastric or stomal ulcer and facilitate a better diagnosis.

8289 FIFTY PER CENT GASTRECTOMY OR PYLOROPLASTY, WITH VAGOTOMY, FOR DUODENAL ULCER. I. EFFECT UPON HOLLANDER TEST RESULTS

(E.) Brochu, F. L. (VA Hosp., Dallas, Tex.), J. L. Doerr, G. K. Hempel, D. M. Dennis, J. L. Gough and R. P. Hays. Amer. Surg. 33(6): 467-474, 1967.

Of 57 patients with duodenal ulcer treated by vagotomy, 28 had pyloroplasty, and 29 had a 50 gastrectomy on an oblique line removing two-thirds of the lesser curvature, with gastrojejunostomy. Hollander tests were admin. afte a 12-hr. collection of fasting gastric juice. Of those with a rise in free acidity, 20 had received pyloroplasty and 7 a 50% gastrectomy; a rise in total, but not free, acidity, was found in 2 pyloroplasty patients and in 12 wit a 50% gastrectomy. No rise in acidity was four in 6 with pyloroplasty and in 10 with a 50% gastrectomy. A rise in total acidity, free or combined, was found in 22 pyloroplasty patient and in 19 gastrectomy patients. In no case di the result change between a 6-mo. and 12-18 mo. test. It is shown that the choice of drainage

edure after vagotomy affects the incidence
ositive", or free acidity, responses to the
ander test. The response of total, rather
free, acidity may provide a better index of
nplete vagotomy after insulin-induced hypo-
emia. The incidence of incomplete vagotomy
increased 3-fold, when this interpretation
applied to results of tests in patients
r vagotomy and gastrectomy-gastrojejunostomy.
he free acidity response is of prognostic
ificance, 50% gastrectomy and gastro-
nostomy may remove 2 out of every 3 patients
have incomplete vagotomy, from that group
ect to recurrence of ulceration. It is
ght that the mechanism of protection is the
wance of regurgitant-buffering by duodenal
es, with the danger of antral stimulation
ved.

OBSTRUCTING PEPTIC ULCERS. RESULTS OF
TREATMENT. (E.) Fisher, R. D., P. A.
t and G. D. Zuidema (Johns Hopkins Hosp.,
imore, Md.). Arch. Surg. (Chicago) 94(5):
727, 1967.

tal of 65 patients with obstructing
roduodenal ulcers was operated on between
-1965 at the Johns Hopkins Hospital; sub-
l gastrectomy and Billroth II anastomoses
used in 75% of the cases. Postoperative
ogastric decompression was used in all
ients; tube gastrostomy was not used. The av.
ation of postoperative gastrointestinal
ompression was 40 hr., with a span of 24-108
The av. duration of gastrointestinal
ompression after surgery was approx. the same
gastroenterostomy, gastric resection, or
oroplasty. There were no significant differ-
es in the duration of postoperative gastro-
estinal decompression required after vagectomy
association with any of these procedures.
toperative hospital convalescence av. 9.4
s, ranging from 6-35 days for the entire group;
atients required postoperative hospitalization
ger than 14 days. Nasogastric suction was
nd to be an effective method of gastro-
estinal decompression; the relatively short
iod of nasogastric suction used in this entire
up of patients with gastrointestinal
truction indicates that prolonged gastro-
estinal decompression is not necessary. In
ition, the completely uncomplicated convales-
ce in nearly 80% of the patients suggests
t prolonged gastrointestinal decompression is
desirable and that tube gastrostomy may
resent only an additional and unnecessary
erative hazard.

91 MAXIMAL ACID RESPONSE TO HISTAMINE IN
DUODENAL ULCER PATIENTS SUBJECTED TO
SECTION OF THE ANTRUM AND DUODENAL BULB
LLOWED BY VAGOTOMY. (E.) Broomé, A. (Borås
sp., Göteborg, Sweden), H. Bergström and L.
be. Gastroenterology 52(6):952-958, 1967.

A total of 21 duodenal ulcer patients and 5 patients with gallbladder disease were divided into 3 groups according to type of operative procedure. In Group 1, 13 ulcer patients underwent resection of the antrum and duodenal bulb, followed by vagotomy. Group 2 consisted of 8 ulcer patients who underwent pyloroplasty and subsequent vagotomy. Group 3 was composed of 5 cholecystectomy cases which underwent the same preparations for vagotomy as in the others, i.e., a loop of thread was placed around each vagus. Groups 2 and 3 served as controls. Max. acid response of the stomach to histamine (0.024 mg/kg) was determined before and after surgery, and after vagotomy. In Group 1, max. acid response to histamine showed a mean reduction of 51% after resection of the antrum and duodenal bulb; this depressed postresection response was, in turn, reduced by 67% after vagotomy. After resection plus vagotomy, the preoperative max. response to histamine was reduced by an av. of 84%. In Group 2, pyloroplasty alone moderately depressed max. acid response to histamine in all but 1 case; mean reduction was 22%. Vagotomy caused a further decrease, reducing the post-pyloroplasty response by an av. of 51%. As a result of pyloroplasty plus vagotomy the preoperative max. response decreased by an av. of 62%. In Group 3, preoperative and postoperative max. acid responses to histamine were, resp., 12.5 and 12.9 mEq/hr.; variations were minor and no significant differences emerged. These results confirm that resection of the antrum and duodenal bulb significantly reduces the max. acid response to histamine in man, and show that subsequent vagotomy causes a further significant suppression of this response; this indicates that the parietal cell response in man to max. histamine stimulation is facilitated by both basal release of gastrin and direct vagal activation of the parietal cells through a basal flow of vagal impulses.

8292 SURGICAL MANAGEMENT OF DUODENAL ULCER:
EMPHASIS ON VAGOTOMY AND GASTRIC
DRAINAGE. (E.) Pierpont, R. Z. (111 W.
Monument St., Baltimore, Md.), W. K. Brendle,
D. B. Hebb, D. T. Crawford, A. W. Grigoleit and
H. H. Kwak. Amer. Surg. 33(4):334-338, 1967.

Vagotomy and gastric drainage were used for the elective management of peptic ulcer for 12 yr. The 220 patients consisted of 160 men, 60 women; 19-70 yr., av. 50.3. Indications for surgery (number of patients, %, resp.) were: intractable pain, refractory to medical management (126,57.3%); hemorrhage (61, 27.7%); obstruction (23, 10.5%); repeated or previously perforated (10, 4.5%); there were 12 combined gastric and duodenal ulcers. Surgical procedures were vagotomy with pyloroplasty (128,58.2%); vagotomy with gastroenterostomy (78, 35.5%); vagotomy with antrectomy, Billroth I (5, 2.3%); vagotomy with subtotal gastrectomy (6, 2.7%); vagotomy with previous gastroenterostomy (2, 0.9%); pyloroplasty with previous vagotomy (1, 0.4%).

Complications were: pneumonia and atelectasis (3); wound infection (6); wound dehiscence (2); postoperative hemorrhage (1); death (1, 0.45%, due to aspiration of blood in failure to intubate while the patient is awake). Dumping syndrome, wt. loss, and anemia were minimized with conservative management. Flatulence, distention, eructation, and diarrhea were observed in approx. 60% of the vagotomized patients. These were often relieved with bethanechol (15 mg 3 times daily). Symptoms rarely persisted beyond 3 mo. There were 5 recurrences which necessitated reoperation in the form of gastroenterostomy (2), gastric resection (2), and pyloroplasty (1); 4 of these were in the initial pyloroplasty group, 1 gastroenterostomy. There were 3 recurrent symptoms of ulcer in the gastroenterostomy group, all of which responded to simple dietary therapy. The total proven recurrences necessitating reoperation represented a rate of 2.3%. The advantage of recommending early surgery is stressed.

8293 ABO BLOOD GROUP AND SECRETOR STATUS IN STOMAL ULCER. (E.) Langman, M. J. S. (Central Middlesex Hosp., London), R. Doll and R. Saracci. Gut 8(2):128-132, 1967.

Patients of Blood Group O and nonsecretors (persons who fail to secrete ABH antigens in the gastrointestinal mucus) show incidence of stomal ulcers which is higher than the incidence of duodenal ulcers. In the case of nonsecretion, the above difference may be due to the fact that nonsecretion predisposes a patient with duodenal ulcer to come to operation, after which a stomal ulcer may develop. Thus, nonsecretors may not have a greater susceptibility to stomal ulcers. The proper comparison should be between stomal ulcers and those duodenal ulcers that have come to surgery; when this comparison is made, the difference between the 2 series is much smaller and of no statistical significance. In regard to Blood Group O, the situation is less clear; it was found that when patients with stomal ulcers and patients with duodenal ulcers had similar clinical histories, there was no statistical significance in incidence of stomal ulcers in Blood Group O patients. The differences in susceptibility to stomal ulcerations in subjects of various blood groups and nonsecretors is too small to justify taking them into account when selecting patients for any particular type of gastric operation.

8294 PRE- AND POST-OPERATIVE SYMPTOMS OF PATIENTS WITH STOMAL ULCERS. (E.) Jones, J. H. (Central Middlesex Hosp., London) and M. J. S. Langman. Gut 8(2):133-136, 1967.

Patients with duodenal ulcer with previous history of perforation have an increased liability to stomal ulcer, whereas those with a history of pain or obstruction have a comparatively low risk, and those with a history of hemorrhage an intermediate risk of stomal ulce Further evidence shows that patients with blee ing stomal ulcer are particularly liable to ha suffered from a previous bleeding duodenal ulc The association of stomal ulcer with Blood Gro O and ABH non-secretion largely disappears whe the clinical characteristics of previous duode ulcer are taken into account. Therefore, it i likely that it is the clinical characteristics of the duodenal ulcer rather than the ABO bloo group and secretory status of the patient which affect his susceptibility to stomal ulcer.

8295 GASTRIC FIBRINOLYSIS. A POSSIBLE AETIOLOGICAL LINK WITH PEPTIC ULCER. (E.) Cox, H. T. (Withington Hosp., Manchester, England), L. Poller and J. M. Thomson. Lancet 1(7503):1300-1302, 1967.

A study was made of 13 with clinical evidence o chronic duodenal ulceration and 13 who had unde gone upper abdominal operations. Gastric fibrinolytic activity was investigated by takin 2 ml blood directly from a tributary of the lef gastric vein arising in the anterior stomach wall (or from veins arising in the anterior gastric wall towards the greater curvature). Immediately after collection of gastric blood, 5 ml of blood was taken from a peripheral vein. In 3 with duodenal ulceration, additional gastric and duodenal material was obtained duri operation; gastric juice was aspirated from a Ryle's tube and a small portion of gastric and duodenal mucosa was obtained from the specimen excised at pyloroplasty. Standard and modified fibrin plates were used to measure lytic activity, and euglobulin-lysis time was measure Of 13 ulcer patients, 11 showed appreciable zones of lysis in their gastric vein specimens on a standard fibrin plate after 18 hr. of incubation. None of the specimens from the gastric artery or peripheral veins showed a zon of lysis. Of the 13 controls, 5 showed zones o lysis in their gastric vein blood on the standard plate. Of 9 who underwent biliary trac operation, 4 gave positive results; of 2 with malignant ulcer, 1 was positive; of 2 undergoin negative laparotomy, neither was positive. Non of the specimens of blood from peripheral veins showed lysis. In 8 blood was taken from 2 different gastric veins; 6 gave a positive result in 1 specimen, 4 in both specimens; in 6, euglobulin-lysis times were measured and were confirmatory. Free plasmin activity was present in the gastric vein as indicated by activity on heated plates. Saline extracts of gastric mucosa showed lysis on the standard plates only, indicating the presence of plasminogen activator a negative result with this specimen on the heated plate showed the absence of free plasmin. The activity of the gastric juice differed from that of the mucosa, since it was not inhibited by ε-aminocaproic acid; thus the activity was nonspecific proteolysis; 0.1 N HCl alone had no lytic effect; the acid-pepsin mixture caused pronounced lysis, but this was neutralized by

ddition of sodium taurocholate. Anti-
'nolytic drugs may be useful in the treat-
of hemorrhage and also of proved peptic
ration. Bile acts as an anti-proteolytic
t.

EPIDEMIOLOGICAL STUDY OF PEPTIC ULCER
IN THE SOUTH OF INDIA: OBSERVATIONS
MADRAS ON THE CHANGING INCIDENCE OF PEPTIC
R, WITH SPECIAL REFERENCE TO CAUSATION.
Malhotra, S. L. (Western Railway, Bombay).
8(2):180-188, 1967.

emiological aspects of peptic ulcer were
ied in South Indians to determine the signs
symptoms, results of treatment, complications
prevalence of this disease. A total of 469
ents were admitted to the hospital, of which
were treated surgically. The peak age of
ic ulcer was much lower than in the west of
a and a greater degree of cicatrization was
d in operated cases. The incidence of
rrhage, perforation and vomiting was much
er than reported in previous studies; there
also a higher gastric ulcer:duodenal ulcer
o. The reasons for the change in ulcer
vior may be related to changes in eating
ts, higher consumption of bicarbonate-of-soda
elieve dyspepsia and induced vomiting that
oves the HCl, thus weakening the barrier action
ucus and predisposing to ulcers. The
:female ratio was 35:1. This may be
lained by the age structure of the population,
., there were fewer women in the vulnerable
group since most of the women were in the
roductive period of life, when there is less
dency to develop peptic ulcers. Women also
less and took longer over their meals than
in 95% of the families interviewed. Genetic
tors associated with ABO blood groups cannot
lain the change in the ulcer picture, since
important change in blood group distribution
urred. After gastrojejunostomy 3 patients
h duodenal ulcers and low acidities developed
tric ulcers, due to increased duodenal reflex.
er gastrectomy there was complete disappearance
symptoms, gain in wt. and increase in hemo-
bin in most of the patients.

7 PATHOGENESIS OF CINCHOPHEN ULCER OF THE
STOMACH IN THE DOG. (Rus.) Vainshtein,
G. (Med. Inst. Postgrad. Study, Kazan, USSR).
ull. Eksp. Biol. Med. 62(12):50-53, 1966.

e effect of cinchophen (0.2 g/kg body wt.) on
e blood electrolyte level was studied in 3
althy dogs and revealed a disturbance in K
tabolism and in adrenal function. In 1 dog
ich died on the eighth day of the experiment
om cinchophen intoxication, K conc. (in mEq/
ter) increased from 5.2-6.0 to 7.5-7.6. In 2
gs which died on the twenty-first and twenty-
ird day of the experiment, K conc. initially
creased (from 5.2-5.7 to 7.2-7.6, and 5.5-6.5
7.5-7.7, resp.) and was followed by a decrease (in 1 of the 2 after 10 days) to 6.5-6.6 and (in the other) to 4.9-5.3. At autopsy, 1 dog had a massive ulcer in the pylorus; hemorrhages occurred only in the gastric mucous membrane in 2 dogs. A morphologic study showed lesions and a decrease in functional activity of the glomerular zone with a certain increase of function in the nodular zone. The subsequent decrease in K level of the blood was possibly due to repeated vomiting. The disturbance in the K metabolism and decrease in mineralocorticoid function of the adrenal cortex during experimental cinchophen ulceration explains the increase in the gastric secretion, total and free gastric acidity during cinchophen treatment. The data accumulated in this study indicate some similarity in the pathogenesis of experimental cinchophen ulcer and human peptic ulcer.

8298 SYNERGISM BETWEEN COLD AND RESTRAINT FOR RAPID PRODUCTION OF STRESS ULCERS IN RATS. (E.) Senay, E. C. (Yale U. Sch. Med., New Haven, Conn.) and R. J. Levine. Proc. Soc. Exp. Biol. Med. 124(4):1221-1223, 1967.

Female CD rats (180-220 g) were immobilized by a new method (in plastic restraint boxes, described in detail) and then placed in a cold room or refrigerator at 4° or 7°C. Other groups of animals were either 1) restrained in like manner and maintained at room temperature, or 2) refrigerated at 4° to 7° without restraint for a period of 2 hr. before sacrifice. Two hr. later, animals were sacrificed, their stomachs removed and examined for lesions. Of 12 animals subjected to restraint only, none had any gastric lesions. Two (15%) of 13 subjected to cold alone had lesions; 1 (8%) had multiple severe lesions. Of 119 rats subjected to restraint and cold, 79 (67%) had lesions, and 53 (45%) had multiple severe lesions. It is concluded that restraint and exposure to cold acted synergistically to produce gastric ulcers. In addition, restraint using special plastic boxes was found to offer several important advantages over previously described methods. Lesions are produced in 2 hr., there is less variability in the incidence and types of lesions produced, and the animals die infrequently.

8299 PRODUCTION OF DUODENAL ULCERS IN CATS BY INFUSION OF PORCINE GASTRIN. (E.) Emås, S. (UCLA Sch. Med., Los Angeles, Calif.) M. I. Grossman. Gastroenterology 52(6):959-965, 1967.

Porcine gastrin extract, pure porcine gastrin II or saline was admin. by continuous i.v. inj. to conscious, intact cats; the doses of gastrin used were based on studies in other conscious cats with gastric fistulas. Two animals that received porcine gastrin extract for 12 hr. (0.8 g/kg/hr.) in a dose that produced near max. acid and pepsin secretion in cats with gastric fistulas, had a normal appearance of the duodenal and gastric mucosa. In 7 of 8 animals who received the same dose of gastrin extract for 24 hr., ulcers or erosions occurred in the proximal duodenum, with gross bleeding in 4; in addition, 3 animals had ulcers in the pyloric gland region. Two cats that received the same dose of gastrin extract for 96 hr. had duodenal ulcers, 1 with perforation. Neither of the cats had erosions or ulcers in the oxyntic or pyloric gland area. In 4 animals who received 0.2 g/kg/hr. of gastrin extract for 24 hr., duodenal ulcers and erosions were produced in all, but these were less severe than those produced by the larger dose; 2 had small, hemorrhagic ulcers in the oxyntic gland area and 2 had ulcers of similar type in the pyloric gland area. In all of 4 cats, porcine gastrin II infused for 24 hr. in a dose that produced near max. acid secretion in gastric fistula cats (2 μg/kg/hr.), produced severe duodenal ulcers with hemorrhage; none had ulcers in the oxyntic gland area. The pyloric gland area was normal in 1 cat, had multiple erosions in 1, had a very small erosion just proximal to the pylorus in 1 and had multiple, small, rounded superficial ulcers in 1. In cats that received saline i.v. for 12, 24, or 96 hr., the gastric and duodenal mucosa had a normal appearance.

8300 METHODS FOR INDUCING AN EXPERIMENTAL GASTRIC ULCER IN CATS. (Rus.)

Tuldasheva, M. Kh. (Pavlov Inst. Physiol., Acad. Sci., Leningrad, USSR). Biull. Eksp. Biol. Med. 62(11):122-125, 1966.

A study was performed on a total of 70 cats; in the first series gastric ulcers developed in 93.7% of the animals after functional trauma to the CNS (induction of neurosis) and spraying of the gastric mucous membrane with a 0.5% soln. of gastric juice. In the second series, spraying of the gastric mucous membrane with 0.5% of gastric juice alone induced ulcers in 50% of the animals; this was probably due to a somewhat increased conc. of spraying soln. (gastric acidity was 0.25-0.3% HCl). Controls treated with 0.25% soln. of gastric juice revealed no destructive changes to the gastric mucous membrane. In the third series, the admin. of 0.25% soln. of gastric juice in "neurotic" animals resulted in a pre-ulcerative condition and pronounced ulcers in all of the animals; in controls, electric current and a neurotic state had no effect. In cats with a Basov's pouch fistula, 2-2.5 wk. after surgery, changes which were hyper- and hyposecretory in nature occurred in almost all cases; the qualitative composition of the gastric juice was changed in all of the animals. Elimination of the secretion base "interference" (by the Kurtzin modification of the Kriazhew method) was made simultaneously with spraying of the gastric mucous membrane (25 liter of fluid in 2 hr.). After an av. of 22 hr. (10-12 days) of spraying, ulcers appeared and spraying was stopped. The appearance of ulcers was accompanied by an exacerbation of the general condition, anorexia vomiting, emaciation, and in some, the appearan of blood and mucus in the gastric juice. The appearance of ulcers was also accompanied by histomorphological changes of the neurovascular and neuroglandular apparatus. Microscopic examinat of the experimental ulcer of the pylorus reveale lymphocytic infiltration, enlargement of the lymphoid follicles, marked dilatation of the blood vessels, followed by desquamation of superficial epithelial cells, lysis of lymphoid eleme tissue swelling and ulcer formation; morphologi changes in the gastric nerves were of focal and not diffuse character. Thus, this method inclu neural and peptic factors, and resembles the mechanisms which characterize the development of peptic ulcer in man.

8301 INTRAVENOUS DEGRADED CARRAGEENAN AND HISTAMINE GASTRIC ULCERATION IN THE GUINEA-PIG. (E.)

Anderson, W. (U. Strathelyde, Glasgow, Scotland) and P. D. Soman. Nature (London) 214(5090):823-824, 1967.

The absorption of carrageenans, and its stimulation of a protective mechanism in the guinea pig duodenum was studied in an attempt to reproduce the antigastric ulcer effect of degraded carrageenan by i.v. admin. of 2.5 mg/kg of 2 different degraded carrageenans (Eucheuma spinosum and Gigartina pistillata). I.v. admin. significantly reduced experimental histamine gastric ulceration. Although the effective i.v. doses of both carrageenans are equal, intraduodenal admin. of G. pistillata is as effective in preventing gastric ulceration as half the dose of degraded E. spinosum. Dosage of degrade carrageenans varied with the route of admin. Protective effects of both carrageenans coincide with increased acidity of secretion, compared with the histamine group run along with the other 2 groups. Simultaneous i.v. admin. of carrageenan and histamine caused a rise in acid. It appeared that under certain conditions carrageenan can reduce max. acid secretion (histamine), and, under other conditions, can result in an increase of the acid secretion accompanying gastric ulceration, simultaneously providing an anti-gastric ulcer effect. Carrageenan tends to displace the in vivo manyfaceted equilibrium towards the least harmful position.

8302 DUODENAL AND GASTRIC ULCERATION AFTER BURNING. (E.)

Sevitt, S. (Birmingham Accident Hosp., England). Brit. J. Surg. 54(1): 32-41, 1967.

Among 291 patients who died after burning and were submitted to necropsy during 1948-1965 were 26 with acute duodenal ulcers (8.9%) and 42 with acute gastric erosions (14.4%). Statistical analysis indicated a reasonably confident connection between burning and ulceration. Only 4 had lesions in both organs. Duodenal ulceration was

ntly silent in 23 patients but was
ted in 3 because of hemorrhage. One
t died of hemorrhage and another after
ation. The usual location was the posterior
f the first stage and penetration was not
on. One or 2 ulcers were usual and only 4
ts had 3 or more ulcers. Gastric erosions
presented as multiple, tiny, disseminated,
icial lesions suggestive of a specific
, but other kinds were often seen.
ogically, both duodenal and gastric lesions
ften seen colonized by microorganisms,
ally *Monilia* and gram-negative bacilli.
seemed to be invaders from the lumen and
growth *in situ* indicates protection from
Cl or its absence. Colonization by gram-
ve bacilli of the wall of the ruptured
in the case of fatal hemorrhage may have
buted to rupture. Duodenal ulcers were
und within a day of injury nor when the
involved less than 10 or 15% of the body
setting these aside the frequency was 11.9%.
is indicated that duodenal and gastric
occurred either early (during the first
r later, especially in the third and
wk. In children, early duodenal ulcers
nfrequent but later ones were common;
c ulcers were common early and late.
al ulcers seemed less frequent in subjects
od Group A than in Group O subjects.
ce is presented concerning important
ences between duodenal and gastric lesions
tive of different factors in pathogenesis
so of different kinds of gastric erosions.

"CURLING'S ULCER" IN THE GERMFREE MOUSE.
(E.) Einheber, A. (Walter Reed Army
Ctr., Washington, D. C.), R. E. Wren, R. F.
and A. S. Dobek. *Nature* (*London*) 214(5085):
99, 1967.

ree CD-1 mice were randomly divided into 2
s: Group 1 was kept germfree; Group 2 was
ntionalized (contaminated with mixed micro-
flora contained in the cecal contents of
ntionally maintained laboratory mice, with
xception of *Pseudomonas* and *Proteus*);
s 1 and 2 were maintained and handled in
ame way. At 2 mo. after conventionalization
. old), the mice (anesthetized) were burned
mersing the dorsum to the mid-axillary line
the base of the neck to the base of the tail
ter at 76.5°C for 10 sec., giving a third-
e burn over 30-35% of the body surface;
tory orifices and limbs were not burned;
ng was halted by immersion in water at 30°C
0 sec. Steam-sterilized food, which was
before burning, was withheld for 48 hr.,
hen offered to mice housed in 23-25°
tors. Thoracic and abdominal cavities of
d mice that died were opened and exposed to
al buffered formalin; stomachs were opened
the greater curvature and examined grossly
icroscopically; tissue sections were taken
stomachs with lesions, and stained with
toxylin-eosin. The incidence of mice with gastric lesions/total number of mice, in germfree and conventional mice, resp., were: days 0-1, 2/5 and 0/2; 1-2, 7/9 and 11/13; 2-3, 5/5 and 1/3; 3-4, 9/9 and 0/0; 4-5, 5/5 and 1/1; 5-6, 2/3 and 0/0; 6-7, none; 7-8, 0/1 and 0/0. The overall incidence was 30/37 (81%) in germfree, 13/19 (68%) in conventionalized mice. The ulcers were usually grossly visible as multiple foci of hemorrhage; the number and size were not related to the time of death or microbial state; they were restricted to the glandular portion of the stomach and were usually scattered along rugae as discrete, punctate lesions of diameter usually less than 1 mm. It is concluded that the presence of living bacteria is not necessary for gastric ulceration to occur in burned mice.

8304 ACUTE PEPTIC ULCERS IN THE COURSE OF BURNS. (Pol.) Nasiłowski, W. (Inst. Hematol., Warsaw) and Z. Czechowska. *Pol*. *Tyg*. *Lek*. 21(45):1726-1728, 1966.

During 1954-1966, 95 autopsies were performed on subjects with burns; 6 (3 men, 3 women; 20-79 yr. old) had Curling's ulcer (duodenal in 5, gastric in 1). These had 15-35% third-degree surface burns and survived from 11-147 days. Curling's ulcer was the primary cause of death in 3 (from hemorrhage in 1, and perforation in 2). The authors emphasize the diagnostic difficulties which arise from the usually retarded course of the disease and the danger inherent in the use of ACTH and corticosteroids in severely burned cases due to the high risk of ulcer development. The problem of Curling's ulcer is reviewed and discussed from the clinical and pathological points of view.

8305 STUDIES ON THE HALF-TIME OF SULFOBROMOPHTHALEIN IN PATIENTS WITH ULCERS OF THE STOMACH AND DUODENUM. (Pol.) Adamczyk, B. (2nd Surg. Clin., Cracow, Poland), A. Górniak, A. Marczyńska and J. Oszacki. *Pol*. *Przegl*. *Chir*. 39(5):512-515, 1967.

8306 POSTBULBAR ULCER OF THE DUODENUM. (It.) Pagano, C. (U. Genoa, Italy) and N. Piccoli. *Rass*. *Arch*. *Chir*. 4(6 Suppl.):674-691, 1966.

8307 FREQUENCY OF GASTRIC AND DUODENAL ULCERS IN AUTOPSY MATERIAL. (Ger.) Altrock, H. (Inst. Path., Erfurt, Germany) and W. Wöckel. *Deutsch*. *Gesundh*. 22(21):965-968, 1967.

8308 CAUSES OF PEPTIC ULCER. A SELECTIVE EPIDEMIOLOGIC REVIEW. (E.) Susser, M. (Columbia U. Sch. Public Health, New York, N. Y.). *J*. *Chronic* *Dis*. 20(6):435-456, 1967.

8309 GASTRIC ULCER IN THE USA. (Fr.)(Rev.) Rignault, D. Bull. Soc. Chir. Paris 57(2):91-101, 1967.

8310 EFFECT OF A SYNTHETIC MUCUS-FORMER [CARBOXYMETHYLCELLULOSE-Na] ON GASTRIC AND SMALL INTESTINE MUCOSA IN ANIMAL EXPERIMENTS. (Ger.) Kronberger, L. (U. Clin. Graz, Austria). Med. Klin. 62(17):684-686, 1967.

8311 CORTICOSTEROIDS AND PEPTIC ULCER: IS THERE A RELATIONSHIP? (E.)(Rev.) Cooke, A. R. (UCLA Sch. Med., Los Angeles, Calif.). Amer. J. Dig. Dis. 12(3):323-329, 1967.

8312 GASTRIC ULCERATION IN INFANCY. REPORT OF A CASE. (E.) Lukash, W. M. (U.S. Naval Hosp., Philadelphia, Pa.), H. J. Candela, R. R. Ryan and O. F. Nielsen. Amer. J. Dig. Dis. 12(3):318-322, 1967.

8313 INTERRELATIONSHIP BETWEEN THE MORPHOLOGICAL CONDITION OF THE DUODENUM AND THE SECRETORY FUNCTION OF THE STOMACH IN ULCER AND DUODENITIS (BIOPSY DATA ON MUCOSA OF STOMACH AND DUODENUM). (Rus.) Sadkova, T. N. (Leningrad Med. Inst. Sanit.-Hygiene, USSR). Ter. Arkh. 39(6):33-36, 1967.

8314 HYPOTHALAMIC-PITUITARY ADRENAL SYSTEM IN GASTRODUODENAL ULCER. (Rus.) Fisher, A. A. (Kuban Med. Inst., Krasnodar, USSR). Ter. Arkh. 38(11):17-24, 1966.

8315 OUR EXPERIENCE IN THE TREATMENT OF GASTRIC DISEASES (PEPTIC ULCER AND GASTRODUODENITIS) WITH METOCLOPRAMIDE. (Sp.) Arias Vallejo, E. (Nat. Inst. Science, Madrid) and J. L. Galán Navarro. Rev. Clin. Esp. 104(3): 248-255, 1967.

8316 INFLUENCE OF A GANGLION-BLOCKING AGENT, FUBROMEGAN, ON GASTRIC FUNCTION IN GASTRODUODENAL ULCER. (Rus.) Mizin, V. T. (Bashkir Med. Inst., USSR). Ter. Arkh. 39(6): 29-33, 1967.

8317 TREATMENT OF GASTRODUODENAL PEPTIC ULCER WITH NAPHTHENE HYDROCARBONS OF NAPHTHALENE PETROLEUM. (Rus.) Baladzhaeva, S. S. (Inst. Kurortol. Baku, USSR). Vop. Kurort. Fizioter. 32(3):249-253, 1967.

8318 PATHOGENIC FACTORS AND THERAPEUTIC CRITERIA OF POSTOPERATIVE PEPTIC ULCER: CLINICAL REPORT ON 39 CASES. (It.) De Vecchi Pellati, M. (Fatebenefratelli-Fatebenesorelle Ciceri Agnesi Hosp., Milan, Italy), W. Rossi and A. G. Barbieri. Chir. Ital. 17(3):398-411, 1965.

8319 POSTOPERATIVE RECURRENCE OF PEPTIC ULCER. (E.) Woodward, E. R. (U. Florida Coll. Med., Gainesville). Bull. Soc. Int. Chir. 26(2):136-140, 1967.

8320 HISTORY OF OPERATIVE TREATMENT OF GASTRODUODENAL ULCER. (Ger.)(Rev.) Kunz, H. Bull. Soc. Int. Chir. 26(2):101-104, 1967.

8321 RESULTS OF ANTRECTOMY AND VAGOTOMY IN THE OPERATIVE TREATMENT OF DUODENAL ULCERS. (Pol.) Miller, J. M. (1st Surg. Clin Warsaw) and S. Zając. Pol. Przegl. Chir. 39(5 508-511, 1967.

8322 GASTRODUODENAL ANASTOMOSIS BY PEANS' TECHNIC IN THE SURGICAL TREATMENT OF DUODENAL ULCER. (180 CASES). (Fr.) Chaubin, (Tenon Hosp., Paris) and L. Franco. Ann. Chir 21(5-6):251-261, 1967.

8323 ULCER-CARCINOMA OF THE STOMACH IN ISRAEL. A STUDY OF 346 GASTRECTOMY SPECIMENS. (E.) Thorgeirsson, T. (Hadassah M Sch., Jerusalem) and I. S. Levij. Trop. Geogr Med. 19(1):1-7, 1967.

8324 PRESENT STATUS OF SURGICAL TREATMENT UNCOMPLICATED DUODENAL ULCERS. (Ger. Hollender, L. F. (Surg. Clin. B, Strasbourg, France). Actuelle Chir. 2(3):147-154, 1967.

8325 PEPTIC ULCER. PATHOPHYSIOLOGY AND CURRENT TRENDS IN SURGICAL THERAPY. (E.)(Rev.) Cameron, J. L. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and W. F. Ballinger New York J. Med. 67(11):1414-1424, 1967.

8326 PYLORUS-PRESERVING GASTRECTOMY AS AN IMPROVED OPERATION FOR GASTRIC ULCER. (E.) Maki, T. (Tohoku U. Sch. Med., Sendai, Japan), T. Shiratori, T. Hatafuku and K. Sugawa Surgery 61(6):838-845, 1967.

8327 TOTAL AND SELECTIVE VAGOTOMY IN THE TREATMENT OF DUODENAL ULCER AND PEPTI ESOPHAGITIS. (Sp.) Villazón Sahagún, A. Cir. Cir. 34(2):95-109, 1966.

8328 DIFFICULTIES IN DIFFERENTIAL DIAGNOSIS BETWEEN LARGE DIVERTICULA AND GIANT ULCERS OF THE DUODENAL BULB. (Ger.) Wendenbur H. H. (U. Clin. Hamburg-Eppendorf, Germany) and H. Wehling. Deutsch. Med. Wschr. 92(18):845-84 1967.

See also abstract nos.: 8025,8173

EFFECT OF DIETARY GLUTEN UPON NEOMYCIN-INDUCED MALABSORPTION. (E.) Levine, (Brooklyn-Cumberland Med. Ctr., N. Y.). oenterology 52(4):685-690, 1967.

ole of dietary gluten in the pathogenesis of cin-induced malabsorption was investigated healthy volunteers receiving daily p.o. . of 2 or 12 g of neomycin during weekly periods. Neomycin, at both dosages, with luten-free diet or the gluten diet, induced ficant and reversible depressions of plasma fatty acids, serum cholesterol and carotene, rinary D-xylose excretion. Diarrhea, wt. and steatorrhea developed only with the dose. During control, experimental, and ery periods of 1 wk. each, with dietary n restriction or supplementation, no altera- were observed in the histology of the normal al mucosa or in the bacteriology of the um, which remained sterile. The data indicate the presence or absence of gluten in the failed to influence the development or extent e malabsorption produced by admin. of neo- for 1 wk.

EFFECT OF ENDOTOXIN ON IRON ABSORPTION. (E.) Cortell, S. (Walter Reed Army Inst., Washington, D. C.) and M. E. Conrad. J. Physiol. 213(1):43-47, 1967.

oxin produced marked abnormalities in Fe ption and metabolism in male albino rats n hr. after the admin. of a parenteral dose. ges observed during the first day after inj. unique; there was decreased absorption of th a normal intestinal Fe content, an acceler- rate of clearance of Fe from plasma, and eased serum Fe conc. That a generalized toxic effect upon the intestine was not the e of these changes was suggested by the normal stinal histology and lifespan of mucosal cells, al absorption of glucose and unchanged ex- ive absorption of Fe by endotoxin-treated, epleted animals. Two days after admin. of toxin, most of the abnormalities had become al, except that the intestinal Fe content eased, and a significant decrease in Fe rption persisted. It was only during this r period that Fe-depleted rats had decreased rption of Fe from the intestine. It is ested that the acute absorptive defect was uced by a decreased capability to transfer Fe the mucosal cell into the body, whereas the defect was associated with impaired entry of aluminal Fe into the intestinal absorptive cells.

LACTOSE MALDIGESTION IN AUSTRALIAN ABORIGINAL CHILDREN. (E.) Elliott, . (Adelaide Child. Hosp., Australia), G. M. ell and N. Vawser. Med. J. Aust. 1(2):46-49, .

Widespread occurrence of stunting, respiratory and gastrointestinal disease was found in 324 Australian aboriginal children less than 15 yr. old at Papunya, Australia and among 62 children (preschool age) at Maningrida. Lactose digestion tests were performed and demonstrated a higher incidence of abnormal test results than could be expected in a similar group of Caucasian children: lactose maldigestion was strongly correlated with age, and to a lesser extent, inversely related to wt. percentile groups. Abnormally low lactase activity (lactase determinations on low duodenal or high jejunal mucosal specimens) correlated well with the results of lactose tolerance tests. Sucrose tolerance and xylose absorption tests were essentially normal in most of the children; in accord with this, pathological examination of the mucosal specimens showed no structural alterations. Hemoglobin levels and serum protein levels were essentially normal. Lactose maldigestion was widespread among these children, but the cause of the defect or its relationship to malnutrition or gastrointestinal symptoms, remains obscure.

8332 AN IN VIVO METHOD FOR STUDY OF INTESTINAL ABSORPTION IN THE UNANESTHETIZED RAT. (E.) Small, M. D. (D. C. Gen. Hosp., Washington), V. Folen and F. I. Marcus. J. Lab. Clin. Med. 69(5):879-884, 1967.

An in vivo technic for repetitive evaluation of absorption in unanesthetized rats is described in detail. A polyvinyl tube is implanted in the duodenum and ileum of rats, and is so localized that it can easily and atraumatically be exposed; it is connected to an infusion and collection system and used in the study of absorption of materials. ^{14}C-Polyethylene glycol (molecular wt. 4000), employed as a nonabsorbable marker to correct for dilution of absorption of the solvent, is simply and automatically determined in a scintillation counter, thus reducing the amount of time and work required for evaluating the remaining nonabsorbable marker to a minimum. This preparation was used in assessing the absorption of xylose and glucose in rats. The xylose which remained was determined by the method of Roe and Rice, and glucose was quantitated by the modified Somogyi method; ^{14}C-polyethylene glycol determinations were made in a Packard Tri-Carb Model 314-EX liquid scintillation counter. This animal preparation showed considerable stability. The animals regained their preoperative wt. within 2 wk. after the operation and continued to gain in a relatively normal fashion up to 5 mo. after the procedure. Absorption values obtained for glucose and xylose indicated that approx. 57% of the glucose was absorbed, while only 10% of the xylose was absorbed. The relative absorption rate (with glucose considered as 100) was comparable to that determined by Cori, with xylose being absorbed 15% as rapidly as glucose.

8333 MALIGNANCY IN ADULT COELIAC DISEASE AND IDIOPATHIC STEATORRHOEA. (E.) Harris, O. D. (Gen. Hosp., Birmingham, England), W. T. Cooke, H. Thompson and J. A. H. Waterhouse. Amer. J. Med. 42(6):899-912, 1967.

A total of 202 patients (108 men, 94 women) with either adult celiac disease (136) or idiopathic steatorrhea (66) were studied to assess the frequency of occurrence of cancer among them. There were 31 malignancies in 29 patients (16 in adult celiac disease patients, 15 in idiopathic steatorrhea patients); 27 were either lymphoma or cancer of the gastrointestinal tract. For the total group, the mean duration of all symptoms was 24.4 yr., and the mean age at time of diagnosis was 39.6 yr.; for those with adult celiac disease, the mean duration of symptoms before diagnosis of lymphoma was 21.2 yr., and of cancer of the gastrointestinal tract, 38.5 yr. Of 77 patients who died, 26 did so from malignant disease. Of carcinomas of the gastrointestinal tract, 4 occurred in patients with adult celiac disease and 9 occurred in 8 with idiopathic steatorrhea; 6 were in the esophagus, 3 in the stomach and 1 each in the tongue, colon, rectum and anus. The collective incidence of gastrointestinal tract carcinoma was 6.4%. In the total group of 14 in whom lymphoma developed, 8 had adult celiac disease and 6 idiopathic steatorrhea; the overall incidence was 6.9%. Of the total 14 lymphomas, 10 were reticulum cell sarcoma (located in jejunum, 6; ileum, 2; stomach only, 1; and extragastrointestinal tract, 1); extragastrointestinal tract Hodgkin's disease was found in 4. It is concluded that both adult celiac disease and idiopathic steatorrhea can be complicated by either lymphoma or carcinoma of the gastrointestinal tract (especially the esophagus); the incidence is highly significant in men, and significant in women. A gluten-free diet appeared to lessen significantly the incidence of malignant complications in adult celiac disease, especially in women.

8334 SELECTIVE IgA DEFICIENCY WITH STEATORRHEA. A NEW SYNDROME. (E.) Crabbé, P. A. (St. Pierre U. Clin., Louvain, Belgium) and J. F. Heremans. Amer. J. Med. 42(2):319-326, 1967.

A 60-yr.-old woman is described with osteomalacia and malabsorption syndrome resembling nontropical sprue. She was given a strict gluten-free diet and vitamins to be taken p.o. with Fe and folic acid supplements. Definite subjective improvement was observed after 1 yr. of the diet, and by this time there was a return to normal values of the hematocrit, hemoglobin conc., proteinemia, fecal fat excretion, and intestinal absorption of D-xylose. A 6-wk. course of gluten challenge was introduced. After this she was discharged on a gluten-free diet with vitamin supplements. During gluten periods, hematocrit, hemoglobin, D-xylose absorption, fecal fat excretion and total serum protein were abnormal. IgA was not detectable in her serum; no trace amounts were detected during the 14-mo. follow-up. IgM and IgG conc. were normal (120 and 1260 mg/100 ml, resp.) at initial measurement and were not repeated. Imm globulins were measured in the following exocri secretions: tears, whole saliva, gastric and intestinal secretions. IgA could not be demonstrated in any of her secretions or in any of those of normals; IgM was detected in normal sa and in her tears and saliva; IgG in all sources in the normal and in the patient. In her intes tinal mucosa, all specimens showed a definite predominance of IgM-containing cells, which wer often tightly packed; the population densities cells containing IgA were always much lower, an in many interstitial areas they were sparse; plasma cells containing IgG were slightly incre in number. The widespread nature of IgA defici suggested that this was the primary event in th patient.

8335 INTESTINAL ULCERATION--A COMPLICATION OF CELIAC DISEASE. (E.) Bayless, T. (Johns Hopkins U. Sch. Med., Baltimore, Md.), R. F. Kapelowitz, W. M. Shelley, W. F. Ballinge II and T. R. Hendrix. New Eng. J. Med. 276(18) 996-1002, 1967.

A diagnosis of adult celiac disease was made on the basis of malabsorption, an abnormal small intestine X-ray pattern, normal pancreatic func tion on a secretin test, and the small intestin biopsy changes characteristic of celiac disease The 37-yr.-old male was placed on a gluten-free diet, with rapid subjective and objective impro ment; he gained 12.2 kg in 4 mo., and fecal fat excretion became normal. He followed the glute free diet for the next 5 yr., having 1 formed stool daily. Repeated intestinal biopsies (0, 6 yr.) showed marked improvement. After 7 yr., a large ulcer abutting the superior mesenteric artery was found at the third portion of the duodenum. Gastrojejunostomy and vagotomy were performed. Hospitalization on a strict gluten-free diet continued for 2 mo. On 60 mg predniso daily, his appetite and sense of well-being increased, his body wt. stabilized, he became afebrile, but leukocytosis continued. Predniso was reduced to 25 mg daily on discharge. He was soon readmitted for intestinal perforation. He died at 44 yr., 10 mo. after onset of abdominal pain. The pathological appearance of the ulcers was entirely nonspecific. The hard, calcified granulomas in the liver and lung were thought to represent previous exposure to Histoplasma. The were no fungi or granulomas in the small intesti and it was considered quite unlikely that the intestinal ulcerations were caused by histoplasm sis. The widespread foci of moniliasis, surroun by acute reactive changes, were a terminal event in a debilitated, cachetic patient receiving adrenocortical steroids. Fifteen other cases from the literature are described with either proved or probable celiac disease in whom multip small intestinal ulcers developed; 12 died as a result of ulceration. These ulcers appear to be complications of celiac disease. They may preve

atient's response to a gluten-free diet
ay thereby obscure the diagnosis of celiac
se.

STEATORRHEA AND MALIGNANT LYMPHOMA.
THE RELATIONSHIP OF MALIGNANT TUMORS
MPHOID TISSUE AND CELIAC DISEASE. (E.)
d, W. I. (Bristol Roy. Infirm., England),
Cornes, K. R. Gough, C. F. McCarthy and
Read. Amer. J. Dig. Dis. 12(5):475-490,

patients (Group 1) with celiac disease and
nant lyphoma are presented; none had been
eas where tropical sprue was endemic.
ence is made to another 17 patients (Group
th reticulosis and steatorrhea. Of the 7,
oms began in childhood in 2 and had presented
yr. in 4 others. Diarrhea, lassitude, and
oss were common symptoms and glossitis,
ng, and abdominal distention were frequently
An enlarged liver or spleen were never
ved. Four patients had megaloblastic anemia.
survived a considerable time from the
osis of celiac disease. The 7 had severe
xtensive mucosal lesions. The process
ved all of the small intestine in the 4
nts in whom autopsy was performed and was
s severe proximally. The lesion was not
y. The intestine was often dilated and the
abnormally thin. In Group 2, 7 had partial
us atrophy of the intestine and 3 had a
e mucosal lesion. Approx. half the group
treated with gluten-free diets without
nse. Mucosal changes were compatible with
iagnosis. Cancer was diagnosed in the 24
nts (13 men, 11 women) at an av. age of 57
Five had the disease in the intestine
ned to 1 discrete lesion, 6 had up to 3
ns, 8 had multiple lesions or diffuse infil-
on. The incidence of Hodgkin's disease was
There was a tendency for most of the tumor
e to be in the abdominal cavity, usually
ly associated with the digestive tract.
d occurred frequently along the para-aortic
ediastinal lymph channels; 5 had invasion
e spleen by the tumor; mesenteric nodes
enlarged in all 24; peripheral lymph node
gement was observed in only 2. Of the 24,
ed within 3 mo. of the diagnosis of lymphoma
e clinical diagnosis of cancer; in 5 the
osis was made at autopsy. Of the 4 who
ved more than 6 mo., 3 had a lesion that
red localized at operation and was resected;
these had 3 enlarged, tumor-free mesenteric
; 2 had Hodgkin's disease. It is concluded
when steatorrhea occurs with malignant
oma: the tumor is found most commonly in
roximal small intestine; the incidence of
in's disease is increased; there appears
a higher than normal incidence among women;
nset of lymphoma is later than usual, and
rognosis is poorer.

RESPONSE TO A GLUTEN-FREE DIET OF
PATIENTS WITH THE COELIAC SYNDROME.
(E.) Pink, I. J. (St. Thomas Hosp., London)
and B. Creamer. Lancet 1(7485):300-304, 1967.

Fifty-four patients with celiac syndrome were put on a gluten-free diet; 70% (38 patients) returned to full health. The remaining 30% were divided into 3 groups as follows: 5 patients (with small, severe and extensive intestinal mucosal lesion) who deteriorated after gluten withdrawal, 3 patients (with flat mucosal-biopsy specimens, and pancreatic deficiency) remained chronically ill, and 8 patients who unexplainedly responded only partially to gluten withdrawal. Follow-up ranged anywhere from 6 mo. to 14 yr. Those 38 patients with swift normalization of health became normal within 6 mo., the response clearly starting within 2 wk. in most of the patients (1 died 2.5 yr. later of Hodgkin's disease). The patients who deteriorated (5 patients) were the only ones of the failure group to benefit from steroids. The second group of failures (3 patients) were not improved with steroids. The third group of failures were not given steroids.

8338 ILEOCOLIC TUBERCULOSIS WITH IRON MALABSORPTION. (Fr.) Martin, F. (Herriot Hosp., Lyon, France), J. P. Lenglet and R. Lambert. Lyon Med. 217(25):1833-1844, 1967.

8339 A NEW CASE OF ANEMIA DUE TO SPECIFIC MALABSORPTION OF VITAMIN B_{12} WITH PROTEINURIA: STUDY OF MEGALOBLASTIC ANEMIAS IN THE CHILD DUE TO PRIMARY AVITAMINOSIS B_{12}. (Fr.) Gorin, R. (Child. Hosp., Paris), C. Salama and F. Guillien. Sem. Hop. Paris 43(21):1383-1398, 1967.

8340 CHANGES IN THE MUCOSA OF RAT SMALL INTESTINE IN MALABSORPTION SYNDROME FOLLOWING NEOMYCIN TREATMENT. (Pol.) Książkiewicz-Szapiro, M. D. (Inst. Sci. Res., Warsaw) and Z. Lewicki. Pol. Arch. Med. Wewnet. 38(5):611-619, 1967.

8341 HYPERTHYROIDISM AND STEATORRHEA IN AN ADOLESCENT. REPORT OF A CASE. (E.) Raffensperger, E. C. (U. Pennsylvania Hosp., Philadelphia). Amer. J. Dig. Dis. 12(6):646-652, 1967.

8342 MALABSORPTION SYNDROMES. (Fr.)(Rev.) De Werra, P. (Med. U. Lausanne, Switzerland). Praxis 56(21):710-714, 1967.

8343 MALABSORPTION AND WHIPPLE'S DISEASE. (Fr.)(Rev.) Lafitte, A. (Broussais Hosp., Paris). Sem. Hop. Paris 43(25):1690-1699, 1967.

8344 WHIPPLE'S DISEASE. (Fr.)(Rev.) Boddaert, J. J. C. (State U., Ghent, Belgium). *Acta Gastroent. Belg.* 3(2):132-139, 1967.

8345 A CASE OF WHIPPLE'S DISEASE FOLLOWED UP FOR ELEVEN MONTHS. (Fr.) Dubarry, J. J., H. Leger, Y. Auche, J. P. Bernard, J. Faivre and P. Lavial. *Arch. Mal. Appar. Dig.* 56(3):177-188, 1967.

8346 SERUM CHOLESTEROL LEVELS IN DIGESTIVE TRACT DISEASES. RELATION TO MALABSORPTION SYNDROME (4). (Cz.)(Rev.) Krondl, A. (Res. Inst., Prague), M. Vulterinová, I. Skála, R. Štastná and M. Vavrečka. *Cas. Lek. Cesk.* 106(18):480-485, 1967.

8347 REVERSIBLE SECONDARY DISACCHARIDASE DEFICIENCY. (E.) Welsh, J. D. (U. Oklahoma Med. Ctr., Oklahoma City) and M. G. Porter. *Amer. J. Dis. Child.* 113(6):716-720, 1967.

8348 SPURIOUS STEATORRHOEA. (E.) Bamfo J. (St. Thomas's Hosp., London), P. S. Murray and A. H. Roberts. *Brit. Med. J.* 2(5553):682, 1967.

See also abstract nos.: 7816,8179

HUMAN SERUM ANTIBODIES AGAINST RAT
COLON MUCOSA. (E.) McGiven, A. R.
sh U., Melbourne, Australia), S. P. Datta
.. C. Nairn. Nature (London) 214(5085):288-
1967.

y normal sera, 18 Group 0 (4 men, 14 women;
yr.), 1 Group A (40-yr.-old man), 1 Group
9-yr.-old woman) were examined before and
human RBC absorption. For hemagglutination,
were inactivated by heating at 56° C for
n., and absorbed twice with human A_1 cells
move all hemagglutinating activity for A
; each serum was then further absorbed by a
e treatment with washed sheep RBC. Tests
carried out with equal vol. of absorbed sera
heep RBC sensitized with freeze-dried antigen
red from a phenol water extract of germ-free
eces. For immunofluorescence, quick-frozen
s of rat colon mucosa were cut at 6 μ,
ed by the sandwich method with goat anti-
globulin labeled with lissamine rhodamine B.
era agglutinated with sheep cells sensitized
rat feces antigen. The titer was usually
ed after absorption with A_1 cells; reduction
ot always related to anti-A titer of un-
bed sera. Seven sera gave immunofluorescent
ing of rat colon mucosa. This was partially
mpletely inhibited after absorption with A_1
, but activity persisted in 4 absorbed sera
as strong in 1. Staining both by absorbed
onabsorbed sera was located in the cytoplasm
e mucosal cells and in the intraluminal
. Staining was not closely related to the
A titer or to the hemagglutination titer
the sensitized sheep cells.

EHLERS-DANLOS SYNDROME CAUSING INTES-
TINAL PERFORATION. (E.) Aldridge,
(Wellington Pub. Hosp., New Zealand). Brit.
rg. 54(1):22-25, 1967.

patients with Ehlers-Danlos syndrome are
ly described, 2 with spontaneous perforation
e intestine, 3 with skin lesions only. Two
e latter 3 are sons (10 and 12 yr.) of 1 of
ormer 2. The difficulties to the surgeon
tressed. Treatment of intestinal complica-
should be along routine lines, bearing in
the fragility of the tissues in general and
endency to wound dehiscence and sepsis.
hes should be through more skin and s.c.
e than is normally used, should be tied
ly and should remain in the wound for a
r period than normal.

AN APPLICATION OF TRANSINTESTINAL
INTUBATION TO THE STUDY OF THE COLON.
Torsoli, A. (U. Rome), P. Arullani and
sale. Gut 8(2):192-194, 1967.

irst phase of the technic for studying the
is the conventional end-to-end intubation,
lasting from 48-120 hr. for passage. The second phase is the anterograde or retrograde introduction of instruments. Anterograde introduction did not cause discomfort, alteration in the gut, or bleeding. A constricted tract of intestine is a contraindication. The Crosby capsule was introduced by anterograde transintestinal pilot intubation, and biopsies were performed on the right and left colons in more than 65 patients. This method of intubation also was used to measure intraluminal pressure and pH, and to collect samples. Biopsy, telemetry, or aspiration maneuvers were guided by radiotelevision. Radiotelevision was used on an av. of 5 times per patient, and the individual controls in intubation did not exceed 20 sec., i.e., 0.15 mA/sec. 90KV. During maneuvers, controls with the same values did not exceed 3 min. The total irradiation of each patient, therefore, was not more than 50 mA/sec.

8352 AN OBJECTIVE EVALUATION OF THE ANAL SPHINCTER FUNCTION AFTER SURGERY PERFORMED FOR RECTAL FISTULAS. (Rus.) Nazarov, L. U. Vestn. Khir. Grekov. 97(11):92-97, 1966.

The av. height of the anal canal in 25 healthy women was 2.5-3.0 cm, and in 25 healthy males it was 3.5-4.0 cm. During sphincter malfunction, these indices decreased to about 2.0-2.3 cm. The apparatus for measurement of the function of the anal sphincter included a rubber bulb (to pump air) connected to a glass containing water; the latter was connected to a partially-filled water manometer (filled to the zero point), which was, in turn, connected to a closing T-valve; the second opening of the latter is connected to a monitor with a rubber bulb (which is inserted into the anus) and the third opening is connected to a single-thread cock; this latter is connected to a mercury manometer and a kymograph. In order to study tonus and contraction force, the T-valve is changed to the position in which the monitor is combined with a water manometer. The air vol. did not exceed 24 cm. This device was used on 50 healthy individuals (25 men, 25 women) and on 106 patients operated upon for all types of rectal fistulas; examination was made either directly after surgery, or 1-3 mo. later. In simple fistulas, function of the anus is restored at approx. the twentieth day after operation, and 1.0-1.5 mo. after surgery for transphincter fistulas. In the case of complex fistulas (84 patients), a normalization occurred 2-3 mo. after surgery.

8353 SURGICAL MANAGEMENT OF COLONIC DIVERTICULITIS. (E.) Giffin, J. M. (Washington U. Sch. Med., St. Louis, Mo.), H. R. Butcher, Jr. and L. V. Ackerman. Arch. Surg. (Chicago) 94(5):619-626, 1967.

The results of surgical treatment of diverticular disease of the colon, performed on 170 patients, are presented; recurrent or persistent diverticulitis existed in 88 patients, and the remainder were treated for regional complications of the disease. Among 152 patients undergoing definitive resectional therapy, 120 had primary colectomy (114 with end-to-end anastomosis, 6 without anastomosis), 20 had a 2-stage resection and 12 had a 3-stage procedure. A complementary colostomy proximal to a colonic suture line was used in 5 of 152 resections. Procedures other than colonic resection were done on 18 patients; these included colostomy in 5, adhesiolysis in 3, drainage in 3, oversewed bleeding point and closure perforation in 1 each, exteriorization in 2 and closure of fistula in 3. Perforation with peritonitis occurred in 20 patients, and in 37 others regional abscess was encountered; colonic obstruction existed in 28. Colonic fistula existed in 14. Among 21 patients undergoing emergency colectomy, 11 had resection for massive bleeding, 3 for peritonitis, 4 for colonic obstruction and 4 for perforation with abscess; there were 6 postoperative deaths (29%). The success of operational therapy was primarily related to the presence of inflammatory complications of the disease; other factors which adversely affected the risk of operative treatment were old age (more than 70 yr.), the existence of more than one complication of diverticulitis, attendant medical illness and the use of emergency colectomy. Primary colectomy was a safe procedure among patients having acute uncomplicated diverticulitis. Patients resected in the presence of open pelvic abscess, peritonitis and colonic obstruction sustained complications with great frequency. Resectional therapy for enteric fistula was not curative when pelvic abscess was seen at the definitive operation. When colostomy and drainage was used primarily, the effectiveness of subsequent elective colectomy was reduced among those patients having persistent pelvic inflammation or abscess. Total abdominal colectomy was much more effective than segmental colectomy as therapy for massive colonic bleeding when the primary site of hemorrhage was not identified at operation.

8354 REGENERATION OF THE HUMAN COLON MUCOSA. MORPHOLOGICAL AND HISTOCHEMICAL STUDY.
(E.) Melnyk, C. S. (U. Chicago, Ill.), R. E. Braucher and J. B. Kirsner. Gastroenterology 52(6):985-997, 1967.

A total of 12 colon mucosa lesions with ages of 5, 7, 9 and 14 days were obtained by excision biopsy from 4 healthy male volunteer medical students (23-26 yr. old), with no previous digestive symptoms or known disease; lesions were approx. 0.5 cm in diameter and included variable amounts of muscularis mucosae and submucosa. Specimens were studied morphologically and histochemically; the following 12 tissue enzymes were studied: glucose 6-phosphate dehydrogenase, diphosphopyridine nucleotide- and triphosphopyridine nucleotide-linked isocitric acid dehydrogenases, LDH, α-glycerophosphate dehydrogenase, malic acid dehydrogenase, glutamic acid dehydrogenase, succinic acid dehydrogenase, diphosphopyridine nucleotide- and triphosphopyridine nucleotide-linked diaphorases, alkaline phosph and leucine aminopeptidase. The normal human colon mucosa regenerated by cellular prolifera and differentiation producing new glandular st tures after biopsy. Grossly, the initial lesi (5 days) appeared as superficial ulcers covere with an exudate on a large mound of erythemato inflammatory tissue. Microscopically, the les were sharply demarcated areas of epithelial excision, with some infolding of the surroundi mucosal edges; the muscularis mucosae was abse in all lesions. The surrounding lamina propri had minimal edema and hemorrhage. The base of the lesion consisted of a dense mixture of infl matory cells, fibroblasts, edema, hemorrhage a dilated vascular channels. Single layers of regenerating epithelium were present at the periphery of the lesions, and their growth appe to be dependent on establishment of a granulati tissue base with an adequate vascular supply. The leading cells of the regenerating layer we flat to cuboidal in configuration. At 7-9 days the lesions continued as a central area of ulce tion on an inflammatory mound, with a moderate decrease in the surrounding inflammatory reacti at the periphery, the ulceration had well established regulating epithelial cell layers in progressive stages of transition. At 14 days there was a reduction in the overall gross infl matory reaction and in the size of the central ulceration. In comparison with the 9-day lesi there was a small increase of regenerating epithelium. There was no regeneration of the muscularis mucosae. Normal colon epithelium h no demonstrable leucine aminopeptidase activity and there was no activity in regenerating epith lium. Alkaline phosphatase activity in normal colon mucosa was observed primarily in the lami propria and submucosa, and regenerating single layers and crypts of epithelium had no enzyme activity. Distributions of dehydrogenase activities were generally similar, with minor variations in intensity of reaction. Surface epithelium had greater enzyme activity than the entire crypt epithelium; enzyme activity in the epithelium at the base of the crypt generally w equivalent to, or less than, that in the upper portion of the crypt. However, succinic acid dehydrogenase was an exception to this; it had greater activity in the epithelium at the base of the crypt. Occasionally, lactic acid, malic acid and diphosphopyridine nucleotide-linked isocitric acid dehydrogenases manifested increa activity at the base of the crypt. The normal lamina propria and muscularis mucosae had enzym activity that was considerably less than the surface epithelium. In the distal layer of regenerating epithelium all dehydrogenase enzym had less activity than the normal surface epith lium but activity generally equal to, or greate than, the normal adjacent crypt epithelium. However, succinic acid dehydrogenase activity w considerably reduced. Distribution of the diap orases was similar to that of the dehydrogenase in normal colon mucosa, with max. activity in t surface epithelium and less in the crypts. The regenerating single epithelial layer had less diaphorase activity than surface epithelium, bu vity equal to, and occasionally less than, the cent normal crypt epithelium. Regenerating ts had enzyme activity equal to, or slightly ter than, the surrounding normal crypt epithe- with both diaphorases. An unusual finding he presence of many neutral fat vacuoles ized in the normal surface epithelium and lamina propria; the regenerating tissue total amount of fat that was definitely less than that present in the normal surface elium. It is suggested that the conc. of ochemical tissue enzyme activity at the luminal r in crypt epithelium is not a specific ng limited to one disease entity, but re- s a regenerative phase of colon epithelium.

COLORECTAL ANASTOMOSIS WITH A SUTURING APPARATUS IN RESECTION OF THE RECTUM OLON.

(E.) Rygick, A. N. (Hosp. 67, w), G. M. Juchvidova, V. L. Rivkin, C. R. eva and J. M. Militarev. Gut 8(2):189-191,

paratus is shown for 1-stage suturing of 2 of intestine with a circular mechanical alum) suture with the help of a cylindrical , the anastomosis fold being directed into umen of the intestine. In 100 experiments davers and dogs, the anastomoses were sound atertight with the mechanical suture; wound ng showed less inflammation than with hand ing. The apparatus was used on 60 patients 3 yr.; (mostly women), 42 with high lary or rectosigmoidal cancer of the rectum, of the tumors at 7-15 cm from the anus. All n anterior resection of the rectum with end- d anastomosis by the apparatus. The apparatus troduced through the anus and the ends of esected intestine are fixed onto the suturing of the apparatus with silk pouch sutures. the ends of the intestine are fixed onto pparatus, they are drawn together and then ed by pressing the movable handle of the atus. The cylindrical knife cuts out the d pouch ends of the opposed intestine and nastomosis is made. Anastomosed ends of ntestine after suturing come in contact with external seromuscular membrane; the mucosal s are in the intestinal lumen. Postoperative- had fecal fistulas. Ten were followed for 2 yr. postoperatively; all were well and nastomosis had not narrowed. The apparatus e used for ileorectal as well as colorectal tomosis. End-to-end, end-to-side, and side- d anastomoses were made in 18 with diffuse osis of the colon and rectum and nonspecific ative colitis. The apparatus can be intro- through the anus and through the lumen of igmoid colon and ileum from the abdominal y. All the patients felt well. Use of the atus shortens low anterior resection of the m by 20-25 min.

A COMPARISON OF RECONSTITUTED COLLAGEN SUTURE AND CATGUT SUTURE FOR COLON ANASTOMOSES.

(E.) Adler, R. H. (Buffalo Gen. Hosp., N. Y.), M. Montes, R. Dayer and D. Harrod. Surg. Gynec. Obstet. 124(6):1245-1252, 1967.

Two absorbable chromicized sutures, 1 of conventional catgut and the other of reconstituted collagen, were evaluated in canine colon anastomoses. The reconstituted collagen suture, due to its origin from beef tendon and because it is extruded from a homogeneous dispersion, was inherently more uniform in its physical and biologic properties and therefore more predictable in its behavior than catgut. There was no significant difference in tensile strength of colon anastomoses sutured with reconstituted collagen or catgut sutures at any period from 3 days-8 wk. postoperatively. Histologic study of the healing wound revealed less prolonged inflammatory tissue reaction with reconstituted collagen sutures than with the catgut. The reconstituted collagen sutures were absorbed more rapidly than the catgut sutures, but this did not affect the strength of the anastomosis and was advantageous in shortening the period of tissue reaction. The reconstituted collagen suture had excellent properties of pliability, ease of handling and secure knot tying; they appeared to be superior to catgut sutures in many respects. These properties are desirable in intestinal surgery, since ease of handling of the suture material helps to minimize tissue trauma during surgical repair.

8357 TWO-STAGE RESECTION OF THE COLON.

(E.) Hubbard, T. B., Jr. (U. Maryland Sch. Med., Baltimore), A. Norico and R. A. Harris. Surg. Gynec. Obstet. 124(5):1081-1084, 1967.

A total of 45, three-stage colonic resections were performed during the period 1955-1966; in 28 cases, obstructing carcinoma was the underlying disease and in 17, diverticulitis. The interval between definitive resection and closure of the colonic stoma ranged from 11-355 days, with an av. of 59 days. Hospitalization after stomal closure ranged from 6-34 days, with an av. of 12.6 days. Total inconvenience, the presence of a colonic stoma, additional hospitalization and a further operation therefore involved an av. of 71 days. Complications after closure of the stoma were wound abscess in 5, atelectasis in 1, ileus of more than 5 days in 2, urinary tract infection in 1, and unexplained elevation in temperature to over 100° F for from 3-8 days in 20. During the same period, 23 consecutive patients with lesions of the left half of the colon and rectosigmoid underwent a 2-stage procedure; in 9, the underlying disease was diverticulitis, with either obstruction, perforation or colovesical fistula, and 14 had acutely obstructing carcinomas. No deaths occurred and there were no anastomotic leaks. Postoperative hospitalization ranged from 6-30 days, with an av. of 14 days. The 2-stage procedure is therefore considered to be the operation of choice. The morbidity and expense of colonic stoma as a third operation is appreciable and should not be ignored, especially in obstructing carcinomas, since surgical intervention offers only short-term palliation in most of these patients. In the 2-stage procedure, closure of the stoma at the time of definitive resection reduces the morbidity markedly without increasing the risk. When the 2-stage procedure is performed, transverse colostomy is advantageously done through a midline incision.

8358 THE USE OF TRIETHYLENETHIOPHOSPHORAMIDE AS AN ADJUVANT TO THE SURGICAL TREATMENT OF COLORECTAL CARCINOMA.

(E.) Holden, W. D. (Univ. Hosp., Cleveland, Ohio), W. J. Dixon and J. W. Kuzma. Ann. Surg. 165(4):481-503, 1967.

The use of triethylenethiophosphoramide (thio-TEPA) as an adjuvant to the operative excision of curable colorectal cancer has been evaluated in a collaborative study of 693 patients, of whom 337 (49%) received the drug in 1 of 2 dosage regimens: Regimen 1, 240 (35%) used a total dose of 0.8 mg/kg body wt.; Regimen 2, 453 (65%) used a total dose of 0.6 mg/kg. In the early post-operative deaths the incidence rate of concomitant diseases and postoperative complications were significantly higher than in the remaining patients. In the drug group, excluding 30-day deaths, the incidence rates of postoperative complications by system were not significantly higher than in the controls (120 in Group 1, 236 in Group 2). In Caucasian men (77) the incidence of postoperative complications was higher (49%) than in Caucasian women (68, 36%) or Negroes (19, 35%). The 30-day mortality was 7%, higher than expected. Av. survival time for mortality within 30 days was significantly longer for drug patients (16 compared with 10.5 days). For the early postoperative deaths no significant differences in the mortality rates by causes of death were observed between the control and drug groups. Survival rates for women over 55 yr. in Group 1 were significantly higher for the drug group than for controls for each of the 7 yr. since operation; no significant differences were observed for men in Group 1 or for either sex in Group 2. In Group 1 the survival rates for those without postoperative complications were significantly higher for the drug group than for controls for each yr. since operation. In Group 1 the survival rates for those without positive lymph nodes were significantly higher for the drug group than for controls for the fourth and sixth yr. after operation. In Group 1 the survival rates for those who did not develop recurrence were significantly higher for the drug group than for controls for the second, third, and fourth yr. after operation. In Group 1 the survival rates for those with tumors located in both the colon and rectum were significantly higher for the drug group than for controls for the fourth, fifth, and sixth yr. after operation. The survival rates for the groups with complications, with positive lymph nodes, with serosal involvement, with vessel invasion, with other organs removed, and with recurrence were significantly lower than those for the corresponding group without these characteristics. Survival rates of those not having positive lymph nodes, seros involvement, or vessel invasion were higher tha for those with only 1 of these characteristics; those with 1 had higher survival rates than thos with 2; 2 higher than 3. The lower incidence of recurrence in women was not significantly different from that of men. No significant differences in death rates were found between the control and drug groups by causes of death. There was no difference in the incidence of the presence of cancer at death between the control and drug groups.

8359 OBSTRUCTION IN CANCER OF THE COLON.

(E.) Floyd, C. E. (Louisiana State U. Sch. Med., New Orleans) and I. Cohn, Jr. Ann. Surg. 165(5):721-731, 1967.

Over a 16-yr. period; some degree of obstructio was noted in 512 patients (approx. 33.3%) of 1741 with cancer of the colon, rectum and anus; there were 240 (14%) with complete obstruction and 272 (15%) with partial obstruction. Accura 5-yr.-survival data were restricted to 323 patients admitted from 1948-1958, of whom 146 had complete obstruction and 177 partial obstru tion. The diagnosis of cancer was made in most patients (405) between the ages of 50-79 yr., with the peak incidence in the 60-69 age group. Negroes comprised 58% of the patients. The lef half of the colon was the most common location for both partial (70%) and complete (72%) obstru tions. In partial obstructions, 26% were in the sigmoid and 27% in the rectum; however, with complete obstructions, 43% were in the sigmoid and only 13% in the rectum. The right and transverse colons were infrequently involved. The most frequently associated colonic or recta disease was hemorrhoids, occurring in 81 cases (28 in complete obstruction, 53 in partial obst tion); adenomatous polyps were found in 59 and diverticulosis in 23, each being equally divide between both groups. Histologically, the carcinomas were adenocarcinoma in 191 of 240 cases of complete obstruction, and in 218 of 272 case of partial obstruction; mucoid carcinoma was ne in frequency, with 12 in complete and 18 in partial obstruction, resp. The operative morta for definitive resections was 10% for complete and 17% for partial obstruction. The operative mortality rate for all decompressive procedures was 24%, but the rate for decompression alone w 50%. There were 22 cases with complete obstruction and 34 with partial obstruction who surviv 5 yr., giving 5-yr.-survival rates of 15% and 19%, resp. On the basis of location of the primary lesion, survival rates were poorest for those with complete obstruction in the right colon (7%), transverse colon (0%) and rectum (6 while there was a relatively good survival rate of 22% for those with complete obstruction in th sigmoid and left colon. Survival rates (5-yr.) for those with partial obstruction were about th

(10-29%) with lesions scattered throughout
olon, but were lower for those with lesions
e rectum (4%). The influence of lymph node
vement was evaluated in 139 patients with
ete obstruction and 155 with partial obstruc-
but not all were observed for 5 yr.; there
o lymph node involvement in 42% (122 cases).
yr.-survival rates dropped progressively
44% for those with no nodes with partial
uction to 16% for those with positive nodes
omplete obstruction. When other organs were
ved, there were no 5-yr. survivors. Survival
es ranged from a low of 9% for one-stage
dures in complete obstruction to a high of
or 3-stage procedures in partial obstruction.
study emphasizes the high operative mortality
ow 5-yr.-survival rate with obstructing
r of the colon, rectum and anus.

PROBLEMS IN DIAGNOSIS OF CARCINOMA OF
COLON. (E.) Donald, J. W. (192
elle St., Mobile, Ala.) and J. G. Donald.
Surg. 165(5):705-708, 1967.

case reports are presented to illustrate
requency of delays in the diagnosis of
ic lesions (cancer) due to a negative Ba
X-ray. Six of the 8 were carcinomas of the
which were not diagnosed on first X-ray
; in 1, the lesion was illustrated in the
of 3 Ba enemas because it was filmed in the
position. Two cases described the difficulty
agnosis of multiple carcinomas of the colon.
culty in diagnosis in each case lay in the
ent deficiencies of the usual Ba examination
e colon. Newer technic(s) of Ba enema exam-
on are discussed, the essential features of
include the use of thin Ba with an approx.
fic gravity of 1.120, high kilovoltage
ment, image intensifier, multiple spot films
ineradiography. The thin mixture of Ba
es semitransparent at high kilovoltage,
ing visualization through a loop of Ba-filled
tine, although it is superimposed upon
er. The intensifier increase the brightness
e fluoroscopic image 3-6 x 10^3-fold and
itates the visualization of more detail
ut dark adaptation. The use of cineradiog-
records the fluoroscopic image and permits
w of the findings to arrive at a diagnosis.
technic has been particularly impressive in
emonstration of polyps and early carcinomas.

OBSTRUCTIVE RESECTION FOR ILEUS OF THE
LARGE INTESTINE CAUSED BY TUMOR. (E.)
v, B. A. (Sklifosovskii Inst., Moscow).
ry 61(5):694-697, 1967.

1954-1964, obstructive resection (Hartmann)
leus caused by cancer of the large intestine,
erformed 43 times, including 10 cases com-
ted by perforation of the tumor or rupture
e intestine above it. Patients were 14 men,
men; 25-92 yr., 37 above 51 yr. old. Of 43,
re serious or critical at admission and 23
were operated on within 24 hr., 3 within 48, 1 within 72; in the remaining 16, complete large intestine evacuation could not be achieved. During radical operation, the proximal end above the tumor was found to be distended, and restoration of gastrointestinal continuity by end-to-end anastomosis was ruled out; obstructive resection was performed. Ten had perforative peritonitis caused by perforation of tumor (6), rupture of intestinal wall above the tumor (3), or necrosis of the transverse colon accompanying a tumor of the distal part of the sigmoid colon. Adenocarcinoma was the most common tumor type. The number of deaths per number of operations was: tumor and obstruction, 4 of 28; tumor, obstruction, perforation of tumor, bowel rupture, fecal peritonitis, 8 of 10; tumor, obstruction, and metastasis, 3 of 5. In a comparison, the mortality with the 3-stage Schloffer method for obstruction was 28%, twice that for obstructive resection (4 of 28 = 14.2%). The obstructive resection technic solves 2 problems in 1 stage: elimination of obstruction and removal of tumor. This method has wide applicability. The restorative operation in the second stage after an obstructive resection is not accompanied by special hazards.

8362 ANTERIOR RESECTION AS SURGICAL TREATMENT OF CHRONIC DIVERTICULITIS. (Sp.) Allender, D. (Sao Lucas Hosp., Sao Paulo, Brazil), E. O. Figueroa, J. M. Allende and G. Zabaleta. *Bol*. *Sanat*. *S*. *Lucas* 28(5):77-80, 1966.

8363 MASSIVE BLEEDING FROM LARGE INTESTINE DIVERTICULA. (Ger.) Koch, W. (Marien Hosp., Hamburg, Germany). *Med*. *Welt* 18(25):1543-1545, 1967.

8364 TREATMENT OF COMPLICATED DIVERTICULITIS. PERFORATION OF THE LARGE INTESTINE INTO THE PERITONEAL CAVITY. (Sp.) Figueroa, E. O. (Sao Lucas Hosp., Sao Paulo, Brazil), D. Allende and J. M. Allende. *Bol*. *Sanat*. *S*. *Lucas* 28(6): 90-94, 1966.

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C. Battisti and A. Cavallari. *Riv. Gastroent.* 18(4):237-260, 1966.

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8373 HIRSCHSPRUNG'S DISEASE. (E.) Carpenter, R. (Univ. Coll. Hosp. West Indies, Jamaica). *Postgrad. Med. J.* 43(497):135-140, 1967.

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8376 SHORT WAVE-DIATHERMY IN COMPLEX TREATMENT OF PATIENTS WITH CHRONIC SPASTIC COLITIS. (Rus.) Karimdzhanov, A. K. (Tashkent Med. Inst., USSR), U. A. Askarov and V. P. Kaliagina. *Med. Zh. Uzbek.* (2):9-12, 1967.

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INOMAS. (Ger.) Deucher, F. (Canton Hosp., u, Switzerland). Schweiz. Med. Wschr. 97(18): 577, 1967.

HISTOCHEMICAL STUDY OF MUCUS SECRETED BY A MALIGNANT TUMOR OF THE COLON IVATED IN VITRO. (Fr.) Beaupain, R. (Nat. Res. Ctr., Nogent-sur-Marne, Val-de-Marne, ce) and E. Wolff. C. R. Acad. Sci. [D] Paris 15):1953-1956, 1967.

INFUSION OF 5-FLUOROURACIL INTO THE HYPOGASTRIC ARTERY FOR MASSIVE ANAL INOMA. (E.) Mackman, S. (U. Wisconsin Med. , Madison) and R. O. Johnson. Amer. J. Surg. 5):699-701, 1967.

THE CLINICAL MANAGEMENT OF VOLVULUS OF THE SIGMOID COLON. A FIFTEEN-YEAR ERIENCE. (E.) Abrams, B. L. (U. Louisville Sch. Med., Ky.) and N. G. Waterman. J. Kentucky Med. Ass. 64(11):1003-1006, 1966.

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8395 NONSPECIFIC INFLAMMATORY GROWTH OF THE RIGHT COLON. (It.) Serantoni, C. (S. Antonino Riuniti Hosp., Fiesole, Italy). Osped. Ital. Chir. 16(2):163-183, 1967.

8396 AN INCISION FOR ANO-RECTAL SURGERY. (E.) Solomon, D. I. (Trafalgar Hosp., New York, N. Y.). Amer. J. Proctol. 18(4):288-291, 1967.

See also abstract nos.: 7704,7712,7713,7890,7891,7892,7894,7900,7984,7987

8397 COLONIC MOTILITY IN ULCERATIVE COLITIS AFTER OPIATE ADMINISTRATION. (E.) Garrett, J. M. (Mayo Clin., Rochester, Minn.), W. G. Sauer and C. G. Moertel. *Gastroenterology* 53(1):93-100, 1967.

The effect of opium on colonic motility was studied in 15 patients (7 males, 8 females; 15-45 yr. old) with chronic ulcerative colitis, as well as in 10 healthy volunteers (8 males, 2 females; 21-35 yr. old) who served as controls; 10 of the ulcerative colitis patients had involvement of the entire colon, 4 had only left-sided colitis and 1 had colitis limited to the right portion of the colon. To test the effect of the usual clinical dose, 10 drops (0.5 ml) of tincture of opium was admin. p.o. to 10 patients and each of the 10 controls; 5 and 15 drops were used in each of 2 and 3 patients, resp., to observe the dose response to tincture of opium of colonic motility. In 14 patients with mild to moderately severe ulcerative colitis, a single low dose (5, 10 or 15 drops) of tincture of opium produced marked hypermotility of the pelvic colon. A temporal relationship between the start of opiate admin. or increase of dosage and the development of toxic dilatation of the colon was noted in another 17 patients with chronic ulcerative colitis, but a similar relationship to anticholinergics (belladonna, propantheline) was not observed. It is concluded that the hypermotility and increased tonus changes produced by narcotics in patients with chronic ulcerative colitis may bear a relationship to development of toxic dilatation of the colon when these drugs are admin. to patients with the acute fulminating form of the disease.

8398 OBSERVATIONS ON THE INCIDENCE AND CAUSE OF ANAEMIA IN ULCERATIVE COLITIS. (E.) Ormerod, T. P. (Westminster Hosp., London). *Gut* 8(2):107-114, 1967.

A study was made of 479 case records to determine whether low hemoglobin levels have any significance in the histories. In addition, 28 ward patients were studied to determine the role of Fe deficiency, shortening of the RBC life, and the lack of B_{12} in these patients. Anemia was more common in women and in patients with whole colon involvement (colitis). Although the mean corpuscular hemoglobin conc. and the serum albumin level fell with the hemoglobin conc., the degree of anemia was not correlated with the length of the history, age, WBC, RBC sedimentation rate or liver-function tests. Hypoferremia was common. One case was presented in which hemolysis occurred during an acute exacerbation of colitis, and was not associated with sulfasalazine therapy or autoimmune phenomena. These studies confirm the view that Fe deficiency exists in ulcerative colitis.

8399 ELECTRON MICROSCOPY OF THE HUMAN RECTAL MUCOSA. A COMPARISON OF IDIOPATHIC ULCERATIVE COLITIS WITH INFLAMMATION OF KNOWN ETIOLOGIES. (E.) Nagle, G. J. (U. Brazil, Rio de Janeiro) and S. M. Kurtz. *Amer. J. Dig. Dis.* 12(6):541-567, 1967.

Rectal mucosa from 10 patients with ulcerative colitis, 1 with acute colitis secondary to *Shigella flexneri* infection and from 1 patient developed chronic colitis after irradiation the for abdominal Hodgkin's disease, was biopsied a studied by light and electron microscopy. Of those with active ulcerative colitis (9), 3 wer receiving no drug therapy, 4 received predniso and salicylazosulfapyridine and 2 received the latter agent alone. Control biopsies from 3 no volunteers and 2 hospitalized patients without large intestine disease were similarly prepared and studied. By light microscopy, mucosa of al ulcerative colitis patients was generally intac but focal changes ranging from simple distortio and flattening of the epithelium to microulcerations were scattered in the crypts and surface. In the presence of active clinical disease, the lamina propria was variably, but usually heavil infiltrated with acute and chronic inflammatory cells. The mucosa of 1 patient in long-term remission lacked the inflammatory exudate in th lamina propria, although focal degenerative changes were present in the overlying epitheliu By electron microscopy, there was an abundance of dense-walled, small vesicles in the cytoplas of most otherwise-intact epithelial cells in specimens from patients with ulcerative colitis Also, there were focal areas of degeneration, ranging from markedly vacuolated to disintegrat epithelial cells, in the crypts and on the surf Epithelial-cell changes appeared to precede infiltration of the epithelial layer by inflammat cells. So-called "crypt abscesses" were found to consist almost entirely of sloughed, degenerated epithelial cells. Basement membrane remai continuous except in areas of frank ulceration. There was no evidence of bacterial or viral invasion of the epithelium. Steroid and/or salicy azosulfapyridine treatment produced no qualitati differences in the above-described findings. Mucosa from the patient with acute shigellosis had many focal areas of severe degeneration simi in most respects to the changes seen in ulcerati colitis; however, intervening epithelial cells lacked the large number of small, dense-walled vesicles typically present in most of the epithe cells found in material from ulcerative colitis patients. Tissue from the subject with colitis after radiation therapy had few changes in commo with ulcerative colitis and shigellosis. It is concluded that the primary morphologic disturban of ulcerative colitis is widely present in epithelial cells throughout the epithelial-cell layer rather than being limited to the crypts. Similarity of many of the changes observed to those noted in other degenerative and inflammato conditions of the rectal mucosa may signify a limitation in the range of structural response t injury rather than a similarity in underlying pathogenetic mechanisms.

OCULAR COMPLICATIONS OF ULCERATIVE COLITIS. (E.) Billson, F. A. (Gen.
rm., Leeds, England), F. T. De Dombal, G.
inson and J. C. Goligher. *Gut* 8(2):102-106,
.

g a group of patients with ulcerative colitis,
f 465 also had complications affecting the
and 12 of 17 were believed to be a genuine
lication of the colitis (i.e., 7 cases of
cleritis and 5 of iritis). The frequency of
dence among 275 women patients was 3.7%; among
men, it was 2.9%. No complications involving
eye developed during a yr. when the patient
in remission. In almost all instances, com-
ations developed in association with a specific,
re attack of colitis. Among the patients
iritis, 5 of 5 also suffered from "true"
tic arthritis; 3 of 5 (all women), from
losing spondylitis, as well. The mean age
hich ocular difficulties developed was 35 yr.,
ontrasted to a mean age of 31 yr. at the onset
olitis.

TOXIC MEGACOLON IN NECROTIZING ULCERATIVE COLITIS. (Ger.) Hellemans, N. (Acad.
., Groningen, Netherlands). *Gastroenterologia*
el) 107(3):157-160, 1967.

2 IMMUNOLOGIC PHENOMENA IN FAMILIES WITH ULCERATIVE COLITIS. (Ger.) Polčak, J.
kyne U., Brno, Czechoslovakia), V. Vokurka
M. Skálová. *Gastroenterologia* (*Basel*)
3):164-167, 1967.

3 NONSPECIFIC ULCERATIVE COLITIS IN CHILDREN. (Rus.) Iudin, I. Iu. (Clin.
Exper. Surg. Res. Inst., Min. Health, Moscow),
. Kanshina, T. F. Kogoy and L. A. Petrov.
Okhr. *Materin*. *Dets*. 11(9):38-45, 1966.

8404 ULCERATIVE COLITIS IN CHILDREN. (Ger.) Schäfer, K. H. (U. Child. Clin. Hamburg-Eppendorf, Germany) and H. Wallis. *Gastroenterologia* (*Basel*) 107(2):112-120, 1967.

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8406 METABOLIC DISTURBANCES IN SURGICALLY-TREATED PATIENTS WITH ULCERATIVE COLITIS. (Ger.) Nedbal, J. (Bulovka Hosp., Prague) and Z. Mařatka. *Gastroenterologia* (*Basel*) 107(3):168-170, 1967.

8407 MEDICAL THERAPY OF ULCERATIVE COLITIS. (Ger.) Demling, L. (City Hosp., Stuttgart-Bad Cannstatt, Germany). *Gastroenterologia* (*Basel*) 107(2):131-142, 1967.

8408 ULCERATIVE COLITIS AS A PSYCHOSOMATIC DISEASE. (Ger.) Jores, A. (2nd Med. U. Clin., Hamburg-Eppendorf, Germany). *Gastroenterologia* (*Basel*) 107(2):121-130, 1967.

8409 ANGIOGRAPHIC PICTURES IN ULCERATIVE COLITIS. (Ger.) Deucher, F. (Canton Hosp., Aarau, Switzerland) and G. P. Marzoli. *Gastroenterologia* (*Basel*) 107(3):153-156, 1967.

8410 ULCERATIVE COLITIS AND LIVER DISEASE. (Nor.) Barkve, H. (State Hosp., Oslo) and E. Gjone. *T*. *Norsk* *Laegeforen*. 87(12):1151-1153, 1967.

See also abstract no.: 7900

8411 A NEW METHOD FOR THE INTRAABDOMINAL MICROSCOPY OF THE TERMINAL VASCULAR BED OF THE RABBIT PANCREAS *IN VIVO*. (Ger.) Heisig, N. (U. Hamburg, Germany). *Z. Ges. Exp. Med.* 142(2):162-174, 1967.

The principle of the method consists of the intraabdominal placement of an optical chamber; the tissue, pancreatic mesentery, is observed through 2 hard, transparent polyvinyl plates, one 2.0 mm thick, corresponding to both stage and slide, the other 0.2 mm, equivalent to the cover glass, removable and held in place within the chamber by means of clamps; 2 cylinders, 1 above, the other below are let into the chamber, their inner ends sealed with cover glasses; the upper cylinder is for the microscope objective and contains the channels for the irrigation of the tissue and thermoelectric junctions for temperature measurement. Either a special microscope condenser with a longer focal distance is used or a fiberglass stub is placed in the lower cylinder for the transmission of light from a conventional condenser to the tissue with some loss in intensity. As magnification increases, the working distance between tissue and objection lens decreases. With this apparatus the least distance between tissue and objective lens lies between 1.0-1.2 mm; special air objectives are required; these lenses have a working distance of several mm approaching the magnification of immersion objectives but having much less resolving power and definition; these are the UMK lenses of the Leitz Co. Proper transducers allow the simultaneous recording of a number of parameters: temperature of the tissues under examination, general body temperature, heart rate, arterial blood pressure, venous blood pressure, electrocardiogram, respiration, acid base balance of the blood cells, and blood cell counts. The method lends itself to photomicrography. One advantage of this method is that physiological factors can be maintained within normal ranges.

8412 PROLONGED AMYLASE ELEVATION. (E.) Ebbesen, K. E. (Lanslasarettet, Ljungby, Sweden) and J. Schönebeck. *Acta Chir. Scand.* 133(1):61-65, 1967.

Ten of 58 patients (17.2%) with pancreatitis had a persistent amylase elevation (over 6 days). In 6 of the 10 a pseudocyst of the pancreas was described; in the other 4 the course followed that of acute pancreatitis. Three other cases with pancreatic pseudocyst were treated, but none had elevated amylase levels and were not included. Pseudocyst was noted in 27 of 69 (39.1%) cases of persistent amylase elevation in the literature. Of a total of 79 cases of prolonged amylase elevation, 33 (40.2%) were complicated by pancreatic pseudocyst. The cause of this prolonged elevation in cases of cyst formation may be: (1) persistent or progressive pancreatitis; (2) diffusion from cystic fluid containing amylase, to serum; (3) pressure effect, the cyst compressing pancreati ducts. The authors favor the last, citing experimental evidence from the literature.

8413 TYROSINE METABOLISM AND FAECAL AMINO-ACIDS IN CYSTIC FIBROSIS OF THE PANCREAS. (E.) Gibbons, I. S. E. (Inst. Child Health, London), J. W. T. Seakins and R. S. Ersser. *Lancet* 1(7495):877-878, 1967.

Of 32 children (8 mo.-16 yr. old) with established diagnosis of cystic fibrosis of the pancreas, 3 long-standing cases were taken off treatment with pancreatic supplements and investigated; 4 new cases were investigated before and after treatment. Controls were 15 normals (2 mo.-14 yr.). All received a normal ward diet and supplementary vitamins. Urine specimens (24 hr.) were collected into merthiolate and stored at 4°C for 24 hr., or deep-frozen and acidified for longer storage. Urinary amino acids were examined by high voltage electrophoresis; phenolic acids were extracted by chromatography (Robinson). Fresh acid urine (10 patients) was tested for p-hydroxyphenylpyruvic acid with 'Phenistix' and reduction of 2,4-dinitrophenylhydrazones to amino acids. Three stools from each patient, collected on separate days, and stools from normals were deep-frozen in solid CO_2 and studied. Stool amino acids were isolated from an acetone extract by 'Zeo-Karb 225 SRC 10' resi Plasma tyrosine conc. 1 hr. before midday meal was determined in 10 patients and 9 normals (Clayton). Phenolic acid chromatograms were also examined for 4-hydroxy-3-methoxymandelic acid. Urinary amino acid patterns were normal in all patients. Av. plasma-tyrosine conc. was 1.6 mg/100 ml in controls, 1.8 in patients; the difference was not significant. Urinary phenolic acids were determined in 21. None showed p-hydroxyphenyllactic acid; all contained p-hydroxyphenylacetic acid, and in 17 of these the level was definitely raised. Tyramine was detected in the stools of the 17 but not in those of normals. p-Hydroxyphenylpyruvic acid was detected in none; 4-hydroxy-3-methoxymandeli acid excretion was normal in all. Stools of all patients with cystic fibrosis, treated and untreated, contained excessive amounts of amino acids, with conc. of leucine, valine, phenylalanine, glycine, proline, and tyrosine being especially high. It is suggested that unabsorbe tyrosine in the lumen of the small intestine is decarboxylated and absorbed when it could be oxidized in the liver to p-hydroxyphenylacetic acid.

8414 AN ANALYSIS OF 600 PATIENTS WITH CARCINOMA OF THE PANCREAS. (E.) Smith, P. E. (Tulane U. Sch. Med., New Orleans,

, E. T. Krementz, R. J. Reed and W. J. Bufkin.
. Gynec. Obstet. 124(6):1288-1290, 1967.

results of treatment of 600 (2.3% of all
ents with cancer) patients with pancreatic
inoma during the period January 1, 1948-
mber 31, 1962 at the New Orleans Charity
ital are presented. The male:female
ratio was approx. 2:1, and for Caucasians it
3:1. Approx. 98% of the patients were over
r. old. The predominant histologic type of
r was the mucin-producing adenocarcinoma;
tumors included islet cell and squamous cell
inomas, and carcinoid tumor. In 13% of
patients, the tumor was confined to the
reas, and in another 31% it was confined to
pancreas and to the regional lymph nodes.
remainder had remote spread at time of
nosis. In 234 (39%) of the patients, the
ase was localized enough to justify curative
alliative operation, but 348 (58%) received
reatment or underwent abdominal exploration.
av. survival for all patients from time of
nosis was 3.2 mo. Only 31 (5.2%) survived
1 yr.; in 5 yr., only 3 patients were alive
2 of these lived for 10 yr. after treatment.
9 patients who had pancreatic-duodenal
ction, 52% died in the hospital. The av.
ival for all patients who had this operation
8.9 mo. compared to 18.4 mo. for those dis-
ged from the hospital. The discharged group
udes 14 patients who survived longer than 1
and 4 who survived 129 mo., 119 mo., 62 mo.,
49 mo., resp. Of 155 patients who had an
ation to bypass the obstructing lesion of
biliary tree, 132 (85.1%) were discharged
the rest died in the hospital. Mean survival
after operation for these patients was 4.7
Patients who left the hospital lived an av.
.3 mo.: 8 lived 1 yr.; 1 lived 36 mo.; 1,
o.; and 1, 21 mo. Patients who had no treat-
survived the shortest time, an av. of 1.8
these included patients who had metastatic
ase unamenable to any treatment. Irradiation,
otherapy or hormones were used on a few
ents, but the av. survival time was not
onged.

CLOSED ISOLATED INJURIES OF THE PANCREAS
IN CHILDREN. (Rus.) Finkel'son, E. I.
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ULTRASTRUCTURAL CHANGES IN THE MOUSE
EXOCRINE PANCREAS INDUCED BY PROLONGED
TMENT WITH ACTINOMYCIN D. (E.) Rodriguez,
. (Northwestern U. Med. Dent. Sch., Chicago,
). J. Ultrastruct. Res. 19(1-2):116-129,
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EFFECTS OF SEVERAL HORMONES AFTER TOTAL
PANCREATECTOMY IN ALLIGATORS. (E.)
os, J. C. (New York Med. Coll., N. Y.), C. H. Wu, M. Reitman, E. Sodero, R. White and R. Levine. Gen. Comp. Endocr. 8(1):32-43, 1967.

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8423 EXOCRINE PANCREAS FUNCTION AFTER CHOLECYSTECTOMY. (Ger.) Hausamen, T. U. (U. Clin. Frankfurt a. M., Germany) and W. Rick. Gastroenterologia (Basel) 107(3): 179-184, 1967.

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TRANSPLANTATION IN THE DOG. STUDY OF 10 CASES. (Fr.) Marchal, G. (Fac. Med., Montpellier, France), C. Romieu, M. Bousquet, C. Solassol, M. Balmes and G. Olivier. Bordeaux Chir. (1):26-37, 1967.

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8434 LATE RESULTS OF ANASTOMOSIS OPERATION FOR PANCREATIC CYSTS. (Ger.) Nowotny, K. (Karl Marx U., Leipzig, Germany) and G. Zeumer. Z. Aerztl. Fortbild. (Jena) 61(10):510-513, 1967.

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8438 TWO CASES OF EXTRA-PANCREATIC TUMORS CAUSING HYPOGLYCEMIA. (Fr.) Barjon, P (Fac. Med., Montpellier, France). Rev. Ass. Med. Lang. Franc. 2(4):161-163, 1966.

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8441 STUDY OF THE EXOCRINE FUNCTION OF THE PANCREAS. ANALYSIS OF WATER AND ELECTROLYTE SECRETION INDUCED BY SECRETIN. (Fr.) Janssen, J. H. (St. Pierre U. Clin., Louvain, Belgium). Louvain Med. 86(5):261-268, 1967.

8442 CARCINOMA OF THE PANCREAS. AN ANALYSIS OF 100 PATIENTS. (E.) Lowe, W. C. (New Jersey Coll. Med., East Orange) and E. D. Palmer. Amer. J. Gastroent. 47(5):412-420, 1967

8443 TOLBUTAMIDE TEST IN PANCREATIC CARCINOMA. (Ger.) Thimm, R. (Med. Clin., Schwerin, Germany). Z. Aerztl. Fortbild. (Jena) 61(11):573-574, 1967.

8444 PANCREATIC CYSTS. (Rus.) Trunin, M. A (Leningrad Sanit. Hygiene Med. Inst., USSR) and E. A. Shakhanova. Sovet. Med. 30(6): 113-117, 1967.

8445 CANCER OF THE PANCREAS (CLINICAL AND DIAGNOSTIC STUDY OF THIRTY CASES). (Sp.)(Rev.) Marrón Ballesteros, J. A. (Jiminez Diaz Found., Madrid). Rev. Clin. Esp. 103(1): 1-13, 1967.

See also abstract nos.: 7831,7849,7850,7851,7852,7872,7875,7927,8025,8027,8029,8475

HEREDITARY CHRONIC RELAPSING PANCREATITIS:
A CLUE TO PANCREATITIS IN GENERAL? (E.)
:hek, P. J. (Marymount Hosp., Cleveland,
. Amer. J. Surg. 113(6):819-824, 1967.

ıdy of an American family of Anglo-Saxon
stry, represented by 37 members of 5 genera-
; (15 women, 21 men, and a 14-yr.-old boy),
enting a total of 5 cases of hereditary re-
ing pancreatitis, indicated that this disease
echanical and therefore amenable to surgery.
cerature review of pancreatitis in children,
of hereditary relapsing pancreatitis revealed
efinite metabolic disorder underlying either
ition, although the most advanced case among
37 in this study showed an abnormal glucose
rance curve. It was suggested that the in-
ted defect is hypertrophy of the sphincter of
, in association with a common ampulla for
ary and pancreatic ducts. This study also
mpts to clarify the development of pancreatitis
ersons without bizarre or unusual dietary
ts, or with no history of alcoholism. The
ing of pancreatitis in some alcoholic persons
not in others suggests that pancreatitis re-
s from hypertrophy increased by spasm incident
lcohol, with fibrosis later. Disturbed func-
of the gallbladder was not believed to occur
r section of the sphincter if the gallbladder
ormal at the time of sphincterotomy.

PROTEINASE INHIBITOR AND TREATMENT OF
ACUTE PANCREATITIS. AN EXPERIMENTAL
Y. (E.) Dos Reis, L. (U. Coimbra, Portugal).
. Surg. 33(4):311-316, 1967.

groups of dogs were used in this double-blind
y. In Group 1, 6 were inj. with sterile
ne i.v. before and after laparotomy when 8 ml
ile was inj. into the resp. accessory pan-
tic duct. Group 2 (6) was similarly treated:
ead of saline, Trasylol was inj. i.v., 10,000
fore and 5000 U after laparotomy. Group 3 (6)
treated similarly; Trasylol was inj. i.v.
re the operation and either a slow drip of
00 U of proteinase inhibitor in 1000 ml
ne followed it (2) or 5000 U were inj. i.v.
y 4 hr. for 3 doses (4). In Group 4 (4) an
mpt was made to produce acute pancreatitis by
s of a standard Pfeffer preparation; only 1
ed small foci of pancreatic necrosis, while
d a suppurative pancreatitis with interstitial
ammatory infiltrations and microabscesses,
out necrosis or hemorrhage; this preparation
abandoned. In Group 1, 5 had severe lesions
cute pancreatic necrosis, 1 had mild lesions;
roup 2, 3 had severe pancreatic necrosis,
d milder lesions; in Group 3, 5 had severe
reatic necrosis, 1 had milder lesions. The
einase inactivator did not change the nature
degree of lesions of experimental acute bile
reatitis. More work is recommended to assess
value of proteinase inhibitors in acute pan-
titis.

8448 ALPHA CELL HYPERPLASIA IN CALCIFIC PANCREATITIS ASSOCIATED WITH HYPERPARATHYROIDISM. (E.) Paloyan, E. (U. Chicago, Ill.), A. M. Lawrence, F. H. Straus, II, D. Paloyan, P. V. Harper and D. Cummings. J.A.M.A. 200(9):757-761, 1967.

These 15 autopsy cases, along with experimental laboratory studies, indicate a relationship between glucagon secretion and parathyroid function. The authors propose the theory that in some cases of chronic pancreatitis the sustained elevation of circulatory glucagon leads to a reactive parathyroid hyperfunction, secondary to the hypocalcemic effect of glucagon, and that this chronic stimulation of the parathyroids could result in hyperplasia or adenoma formation. Evidence indicates that pathologic changes occur first in the pancreas. A reactive hypersecretion of glucagon is suggested, secondary to hypercalcemia, in cases of primary hyperthyroidism not associated with pancreatitis. Conspicuous hypertrophy and hyperplasia of the islets in 12 of 15 cases of parathyroid adenoma or carcinoma (at autopsy) indicates that hyperthyroidism may induce hyperplasia of the islets of Langerhans. In some cases of the pancreatitis syndrome associated with hyperthyroidism, chronic pancreatitis may precede and predispose to hyperthyroidism.

8449 SPLENOPORTOGRAPHY IN DIAGNOSIS OF CHRONIC PANCREATITIS. (Rus.) Trunin, M. A. (Leningrad Sanit.-Hygiene Med. Inst., USSR) and E. A. Odintsova. Vestn. Khir. Grekov. 98(4):58-65, 1967.

8450 A SURGICAL APPROACH TO THE MANAGEMENT OF CHRONIC RELAPSING PANCREATITIS. (E.) Thomas, C. G. (U. North Carolina Sch. Med., Chapel Hill) and H. A. Wellons. W. Virginia Med. J. 63(6):167-171, 1967.

8451 THE FORMS OF PANCREATITIS. (E.) Paloyan, E. (U. Chicago Med. Sch., Ill.). Curr. Probl. Surg. Pp. 3-66, June, 1967.

8452 CHANGES IN "ENERGY POTENTIAL" OF MYOCARDIUM DURING ACUTE PANCREATITIS. EXPERIMENTAL DATA. (It.) Nasta, A. G. (U. Genoa, Italy), A. Podesta and F. DiBella. Rass. Arch. Chir. 4(6 Suppl.):626-638, 1966.

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8455 POSTOPERATIVE ACUTE PANCREATITIS. (Sp.) Santos, M., S. P. Puente, H. Blumberg and A. Aguirre. Hosp. Vina d. Mar 22(1-2):8-12, 1966.

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8457 METABOLIC DISTURBANCES IN ACUTE PANCREATITIS. DIAGNOSITIC, PROGNOSTIC AND THERAPEUTIC CONCLUSIONS. (Fr.) Fourlinnie, J. C. (Lille City Hosp., France), R. Samaille-Piette, B. Combemale and G. Lagache. Lille Chir. 22(2):79-88, 1967.

8458 TRAUMATIC PANCREATITIS AND RETROPERITON RUPTURE OF THE DUODENUM. A COMPLICATI OF STEERING WHEEL INJURY. (E.) Hauman, R. L. (Maumee Valley Hosp., Toledo, Ohio). Ohio Med. 63(6):802-804, 1967.

8459 DIAGNOSTIC SIGNIFICANCE OF DETERMINING SALIVARY DIASTASE IN PANCREATITIS. (Rus.) Shelagurov, A. A. (Pirogov 2nd Moscow Med. Inst.) and L. P. Vorob'ev. Sovet. Med. 30(6):25-29, 1967.

See also abstract no.: 8618

ANTIBODIES TO CYTOPLASMIC ANTIGENS IN
PRIMARY BILIARY CIRRHOSIS AND CHRONIC
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led., New York, N. Y.), F. Schaffner and
oper. J. Lab. Clin. Med. 69(6):979-988, 1967.

ncidence, classification and diagnostic
ficance of cytoplasmic antigens and their
odies were investigated with the fluorescent
ody method in 136 patients. Antibodies were
ved in 79.2% of 53 sera from patients with
ry biliary cirrhosis, 80% of 15 sera from
ic active hepatitis patients, 16.6% of
a from patients with cholestatic viral
itis, 75% of 4 sera from patients with drug-
ed hepatitis, and 14.2% of 7 sera from pa-
s with systemic lupus erythematosis. Five
disease groups showed no antigens, nor did
ontrols. The cytoplasmic antibodies lacked
or species specificity; they were readily
to a wide variety of both human and animal
es, with the best binding obtained with
, monkey and rat stomach; rhesus submaxillary
; and human hyperplastic thyroid sections.
ntibodies were complement-fixing, distributed
l immunoglobulin fractions, and were adsorbed
e more particulated subcellular liver frac-
. They did not correlate with antibodies
ted serologically by complement fixation. It
oncluded that these antibodies are significant
e diagnosis of primary biliary cirrhosis and
ic active hepatitis. Together with other
ologic changes seen in these diseases, they
aid to indicate a complex alteration of the
e system.

DIFFICULTIES IN DIFFERENTIATING AMEBIC
FROM PYOGENIC LIVER ABSCESS. (E.)
R. P. (U. Texas Southwestern Sch. Med.,
s), J. D. Lehmann and J. P. Sanford. Arch.
n. Med. (Chicago) 119(1):69-74, 1967.

medical records of 39 patients with macroscopic
r abscesses (24 pyogenic and 15 amebic) were
ied. Of the 15 amebic abscess patients, 14
younger men (mean age 40) each with a single
on in the right lobe. The older men (51 mean,
edian) in the pyogenic group (13 men and 11
n) showed only 2 cases of single lesion among
20 cases which could be determined, and 18
s of multiple lesions among those 20. Of the
ents with amebic abscess, 80% were under 50 yr.
ge, and 67% of the patients with pyogenic
ess were 50 and older. Eighteen patients with
enic abscess had both lobes of the liver af-
ed. The patients' age and sex appeared to
orrelated with the type of abscess, and may
f some value in differential diagnosis
een the 2 types. The site also may aid
nosis: single amebic abscess lesions oc-
ed in the right lobe, with 1 exception;
iple pyogenic lesions occurred in both lobes,
10% exception.

8462 MEMBRANOUS OBSTRUCTION OF THE HEPATIC SEGMENT OF THE INFERIOR VENA CAVA. (E.) Rogers, M. A. (U. Witwatersrand, Johannesburg, South Africa), E. Chesler, L. Du Plessis, N. Joffe and E. Joubert. Brit. J. Surg. 54(3):221-225, 1967.

Four cases of membranous obstruction of the hepatic segment of the inferior vena cava are described. In a 37-yr.-old male, an obliquely set membrane in the right atrium was identified and pierced after opening of the atrium. Postoperatively, the jaundice, ascites, and edema gradually disappeared and a venogram showed a patent inferior vena cava. He died 4 yr. later in hepatic coma, and complete obstruction of the inferior vena cava was observed at autopsy. In a 25-yr.-old female, a membrane at the level of the diaphragm was pierced in a similar manner and recovery was uneventful. Two patients refused surgery. The well-developed collateral veins which surround the site of obstruction make direct exposure of the inferior vena cava through an abdominal or thoraco-abdominal incision hazardous, due to possible uncontrollable hemorrhage. The recommended procedure involves excision of the membrane under direct vision, with the aid of cardiopulmonary bypass. The inferior vena cava should be drained by a catheter introduced into the femoral vein and moved to the site of obstruction. The superior vena cava should be drained by a catheter introduced through the right atrium and arterial perfusion performed by cannulation of the femoral artery. The occluding membrane can then be visualized by opening the right atrium. Palpation of the drainage catheter in the inferior vena cava will give accurate assessment of the thickness of the obstructing membrane.

8463 ELECTRON MICROSCOPY OF THE LIVER IN NON HEMOLYTIC ACHOLURIC JAUNDICE WITH KERNICTERUS (CRIGLER-NAJJAR) AND IN IDIOPATHIC CONJUGATED HYPERBILIRUBINEMIA (ROTOR). (E.) DeBrito, T. (U. Sao Paulo, Brazil), M. A. Borges and L. C. DaSilva. Gastroenterologia (Basel) 106(6):325-335, 1967.

Ultrastructural findings in liver biopsies from a 6-mo.-old white girl with Crigler-Najjar syndrome are compared with those of a 24-yr.-old white woman with Rotor's syndrome. Optical microscopy of specimens from both cases appeared normal, with an absence of Fe pigment. Electron microscopy in the first case revealed mild pathology: some enlarged, edematous and distorted microvilli, with a faintly electron-dense matrix, projecting into Disse's space. Rarely, organelles resembling mitochondria were detected inside the space. Kupffer's cells seemed slightly enlarged. Electron microscopic study of liver biopsies from the patient with Rotor's syndrome showed hepatic cells in some areas were scarce or distorted because of edema. Many mitochondria were of irregular size and shape, showing fibrillary degeneration. Some mitochondria showed focal areas of desiccation of the matrix. Some pathological cristae were seen. No definite correlation is drawn between ultrastructural changes and abnormal bilirubin uptake in the patients, a striking variation in conjugated bilirubin proportions, and significant increase of indirect bilirubin, although it is suggested that the abnormality may be partially due to changes in the microvilli of the hepatic cell sinusoidal pole.

8464 SUCTION DRAINAGE OF THE SUBHEPATIC AREA AFTER CHOLECYSTECTOMY. (E.) Clemente, C. and B. Manno. Amer. J. Surg. 113(6): 853-855, 1967.

A modified Hemovac apparatus provided active, continuous, closed suction drainage of the subhepatic space in 61 patients recovering from biliary tract surgery. The plastic tube of the apparatus was cut in half, providing 2 tubes with multiple perforations on the inner 6-8 inches of each. Each half was then brought through the abdominal wall through a separate puncture, and the perforated portions of the tubes so arranged that drainage holes extended from Morison's pouch up through the gallbladder bed. Patients seemed more comfortable with the dry and odorless abdominal dressing, seemed to require less analgesics, and seemed to present less postoperative febrile response. No wound infection occurred. Dressing changes were not needed until approx. the fifth day, when the drainage tubes were removed. No postoperative nasogastric suction was required in those patients. During the 5 days of suction, the vol. of drainage decreased gradually from approx. 150 ml to 20-50 ml/day, and the color changed from bright-red to clear and serum-like. No disadvantages were noted, except the added expense of the Hemovac apparatus. No scar resulted from the punctures where the tubes entered through the skin.

8465 HAEMOCHROMATOSIS AND HEPATIC XANTHINE OXIDASE. (E.) Mazur, A. (Cornell U. Sch. Med., New York, N. Y.) and M. Sackler. Lancet 1(7484):254-255, 1967.

Eighteen human liver biopsy samples, in 3 groups, were microfluorometrically analyzed for xanthine activity to determine whether a failure of xanthine oxidase to appear normally in the liver might lead to excessive deposits of Fe such as is seen in hemochromatosis. The range of values in the control samples (obtained during surgery or at necropsy from patients without liver disease), was 1.81-5.49 μmoles of substrate oxidized/g tissue protein/hr. The range of values in biopsy samples from cirrhotic patients was 1.01-0.00. In biopsy samples from patients with idiopathic hemochromatosis it was 1.46-0.00. No xanthine-oxidase activity was detected in 3 of 6 and 1 of 5 specimens, resp., in the last 2 groups, above. The data suggest that idiopathic hemochromatosis is genetically determined, and is characterized by the failure to develop normal levels of hepatic xanthine oxidase activity.

8466 THE ISOENZYMES OF LACTIC DEHYDROGENASE II. PULMONARY EMBOLISM, LIVER DISEASE THE POSTOPERATIVE STATE, AND OTHER MEDICAL CONDITIONS. (E.) Trujillo, N. P. (George Washington Univ. Hosp., Washington, D. C.), D. Nutter and J. M. Evans. Arch. Intern. Med. (Chicago) 119(4):333-344, 1967.

The serum activities of SGOT, SGPT, total LDH, LDH isoenzymes (LDH 1, LDH 2, 3, 4 combined, an LDH 5), total bilirubin, alkaline phosphatase, and thymol turbidity, were serially determined in 30 patients with pulmonary embolism or infarction. In addition, these parameters were assessed in 80 patients with a variety of disorders including liver disease, the postoperati state, paroxysmal cardiac arrhythmias, and congestive heart failure. The changes in serum enzyme activity following uncomplicated pulmona embolism are variable and nondiagnostic. It appears that many factors may be responsible fo the enzyme abnormalities noted. Pulmonary infarction in patients with chronic congestive heart failure produced immediate striking increases of SGOT, SGPT, and LDH and the LDH isoenzymes. The predominant isoenzyme abnormal occurred in the hepatic fraction LDH 1. LDH isoenzyme fractionation is of value in the detection of postoperative myocardial infarctio and in the assessment of enzyme abnormalities in the postoperative period. Nonspecific chang in enzyme activity were noted following acute medical and surgical conditions. These changes may be related to an increase in hepatic enzyme activity as a response to acute stress. Determination of total LDH and in particular LDH 1 is a sensitive index of neoplastic involvement of the liver.

8467 EFFECT OF THE INJECTION OF ALBUMIN INTO THE SUBARACHNOID SPACE OF THE COMMON DUCT-LIGATED DOG. (E.) Laks, M. M. (Cedars-Sinai Med. Res. Inst., Los Angeles, Calif.), I. J. Pincus and D. Garner. Gastroenterology 52(4):662-666, 1967.

Jaundice was induced in 7 dogs by doubly ligatin and severing the common bile duct. Approx. 7-14 days were required for the serum bilirubin conc. to stabilize. A polyethylene catheter was then inserted into the subarachnoid space. Spinal fluid samples were subsequently obtained from the unanesthetized dog. Dog albumin, fraction V (0.1-1.0 g) was placed in a soln. of 3.5-5.0 m of recipient's spinal fluid prior to inj. After inj. a small aliquot was withdrawn for chemical analysis of albumin, total protein, and bilirubin. Spinal and serum albumin, total protein, and bilirubin were determined daily. In the 7 dogs, a repeated and consistent elevation in the bilirubin conc. was observed in the spinal fluid after inj. of 0.9-1.0 g albumin. The

bin conc. reached a peak level in the second
rd day and then required as long as 19 days
urn to the control level. The bilirubin re-
elevated for as long as 10 days after the
n conc. returned to normal. The serum bili-
did not change significantly during the
of rise of spinal fluid bilirubin. The
ly increased bilirubin:albumin ratio on
may have been the result of either an in-
in the albumin-binding capacity or an al-
on in the permeability of the blood-spinal
barrier, or both. Further studies on the
of lowering the serum albumin conc. in
ain and spinal fluid are suggested.

KETOGLUTARATE TOLERANCE TEST IN LIVER
DISEASE. (E.) Barak, A. J. (VA Hosp.,
Nebr.), H. C. Beckenhauer and M. A. Quaife.
enterology 52(4):655-661, 1967.

mental subjects were normal human, cirrhotic
, normal dogs and Eck fistula dogs. Blood
a and α-ketoglutarate were measured. To
simultaneous ammonium tolerance and keto-
ate tolerance curves in both dogs and man,
g, basal samples of venous blood were taken.
um citrate (0.5 mmole/kg body wt.) was
p.o. to subjects and blood samples were
hourly for a 3-hr. period and analyzed for
a nitrogen and ketoglutarate. In experiments
ed to identify the site of conversion of
e to α-ketoglutarate, the vena cava was
erized with a fine polyethylene catheter
oint just beyond the junction with the
c vein; basal blood samples were taken from
epatic vein area and from the portal vein;
te (as above) was inj. into the lumen of
uodenum; hepatic vein and portal vein samples
taken at 0.5, 1, 1.5, 2, and 3 hr. following
te admin. and all samples were analyzed for
lutarate. Citrate feeding produced a tem-
y rise in blood ketoglutarate; in all cases,
l blood showed a very high conc. of keto-
rate following citrate admin., which fell to
normal within 3 hr. Ketoglutarate is taken
the liver, but not completely even in the
l dog; the intestine is responsible for the
rsion of citrate to ketoglutarate and it is
ed into the portal system in this form.
lutarate tolerance curves in normal dogs
higher than in normal humans, but followed
ar patterns. The most abnormal curves were
ned with the Eck fistula, and all cirrhotic
nts studied showed abnormally high curves
compared with normal humans. Thus the cir-
c liver is hampered in removing ketoglutarate
the blood stream, possibly because of liver
damage or extensive collateral circulation.

CHRONIC FAMILIAL HYPERBILIRUBINEMIA.
HEPATIC DEFECT(S) ASSOCIATED WITH
T HEMOLYSIS. (E.) Dollinger, M. R. (San
cisco VA Hosp., Calif.), L. L. Brandborg, V. E.
or and J. M. Bernstein. Gastroenterology
):875-881, 1967.

A 48-yr.-old male is presented who exhibited Rotor's syndrome of chronic idiopathic jaundice with direct hyperbilirubinemia, BSP retention, and normal liver histology. He also had a slightly shortened RBC survival. The apparent onset of jaundice was coincident with a well-documented episode of viral hepatitis in 1942. Fractionation of the retained BSP (46-53%) showed that it was mostly unconjugated. Three of his 5 children showed slight shortening of RBC survival, indirect-reacting hyperbilirubinemia out of proportion to the degree of hemolysis, and elevated BSP retention. It is suggested that the patient's defects in bilirubin and BSP uptake, as well as the low grade hemolytic process, were transmitted to the children, probably as an autosomal dominant. At the present time the children do not show an excretory defect.

8470 THE EFFECTS OF PORTACAVAL SHUNT AND PORTAL FLOW OCCLUSION ON CANINE AUXILIARY LIVER HOMOTRANSPLANTS. (E.) Tretbar, L. L. (Cleveland Clin. Found., Ohio), E. G. Beven and R. E. Hermann. Surgery 61(5):733-738, 1967.

Experimental transplantation of the liver involves either the orthotopic method, in which the host's liver is removed and replaced with a donor's liver, or the heterotopic method, in which an auxiliary liver is transplanted into another region of the host's abdominal cavity without removal of the primary organ. In the latter method, there is a tendency for progressive atrophy of the transplanted liver, nourished as it is by systemic blood. To eliminate this tendency, an end-to-end portacaval shunt that diverts portal flow around the primary liver was tried successfully in dogs. By means of this method portal nutrition is made available to the transplanted organ from the systemic circulation. Immunosuppressive drugs were used for their effect in preventing rejection of the donor liver. The diseases in which an auxiliary liver transplant might be employed most effectively are those of chronic, progressive hepatic failure of a nonmalignant nature such as progressive active hepatitis, congenital biliary atresia or advanced cirrhosis of the liver. In instances of malignant hepatoma, the liver would require removal following the installation of an auxiliary liver. The present study confirmed the need for both adequate blood flow through an intact portal circulation and adequate portal nutrition in order to prevent the atrophy of auxiliary liver homotransplants.

8471 PHARMACODYNAMIC OF INTRAHEPATIC CIRCULATION IN SHOCK. (E.) Mahfouz, M. (U. Alexandria, Egypt) and G. Aida. Surgery 61(5):755-762, 1967.

The hemodynamic burden on dog liver during shock was studied by open circuit perfusion in the denervated, anatomically-isolated, in situ organ. In each experiment the liver was perfused simultaneously through both the hepatic artery and the portal vein; the perfusate being collected from the hepatic vein. This system was tested a few times for equilibration, which was seen to be immediate. No outflow block phenomenon was observed. Control values were recorded for each experiment. The design of this perfusion system permitted the measurement of the effect of any substance on the hepatic artery, the portal vein, and the hepatic vein separately. Results showed that histamine plays the most effective role in shock, increasing both hepatic and portal vein resistance but leaving undisturbed the hepatic arterial flow, even in high conc. The increase in hepatic vein resistance was much more marked than that of the portal vein. The liver becomes swollen as a consequence of its inflow being greater than its outflow. Epinephrine and norepinephrine increased hepatic arterial and portal venous resistances but had no effect on portal vein outflow ratio. Pitressin was seen to decrease both hepatic arterial flow and portal venous flow and to increase portal vein outflow ratio. Serotonin diminished hepatic arterial flow, portal venous flow, as well as portal vein outflow ratio. Previous studies of hepatic circulation only utilized methods which measured total hepatic flow. The present experiment demonstrates the active role played by vasospastic substances in increasing intrahepatic vascular resistance in shock, a cause of its irreversibility.

8472 STUDIES ON HEPATIC EXCRETORY FUNCTION. III. EFFECT OF HYPOPITUITARISM ON THE HEPATIC EXCRETION OF SULFOBROMOPHTHALEIN SODIUM IN MAN. (E.)

Schmidt, M. L., L. M. Gartner and I. M. Arias (Albert Einstein Coll. Med., New York City). Gastroenterology 52(6): 998-1002, 1967.

BSP metabolism was studied in 8 patients (5 men, 3 women; 24-65 yr. old) with hypopituitarism of varied etiology; the hormonal derangement common to the group of patients was deficient growth hormone secretion which resulted from primary deficiency of the growth hormone (2 patients), Sheehan's syndrome (1 patient), surgical hypophysectomy (2 patients) and pituitary irradiation (3 patients). The mean relative hepatic storage capacity (65.8 ± 41) did not significantly differ from that observed in normal subjects (61 ± 18). The Tm_{BSP} was significantly reduced in each patient and ranged from 2.1-5.8 mg/min., with a mean 4.36 ± 1.2 as compared with a mean Tm_{BSP} of 7.6 ± 1.7 in normal subjects; the mean hepatic transport max. was reduced to 43% of normal. There was an increased ratio of conjugated to total BSP in plasma in the patients. These findings suggest that growth hormone deficiency in man probably reduces the capacity of the parenchymal liver cell to excrete BSP into the bile, and support the hypothesis that growth hormone may play an important role in the regulation of hepatic excretory function.

8473 HEPATIC ALCOHOL DEHYDROGENASE IN ALCOHOLIC ADDICTS WITH AND WITHOUT HEPATIC DAMAGE. (E.)

Ugarte, G. (U. Chile, Santiago), M. E. Pino and I. Insunza. Amer. J. Dig. Dis. 12(6):589-592, 1967.

Hepatic alcohol dehydrogenase activity was measured in liver homogenates from 43 subjects; of these, 6 were moderate drinkers without liver disease who had uncomplicated cholelithiasis or functional dyspepsia. The remaining 37 had a long history of alcohol addiction ranging from 3-24 yr., with an av. of 15 yr.; 28 were invetera drinkers and 9, intermittent alcoholics. None had signs of severe liver failure (jaundice, ascites and coma), and prothrombin conc. was above 60% in all of them. Histologic examination of the liver revealed septal cirrhosis in 6, moderate to severe steatosis in 13, and in the remaining 18 there was either a normal histologic picture or some very slight, nonspecific abnormalities, such as small areas of inflammation or degeneration. Hepatic alcohol-dehydrogenase activity was 0.37 ± 0.12 μM/hr./mg of protein in normal controls, 0.18 ± 0.13 μM/hr./mg in alcoholics with normal liver histology, 0.12 ± 0.09 μM/hr./mg in alcoholics with fatty liver, and 0.12 ± 0.08 μM/hr./mg in patients with alcoholic cirrhosis. Alcohol dehydrogenase was significant lower among alcoholics. There was no difference in the activity of this enzyme between alcoholic patients with liver damage and those without liver damage.

8474 NEW OBSERVATIONS BY LIGHT MICROSCOPY ON LIVER HISTOLOGY IN THE HURLER'S SYNDROME. A NEEDLE BIOPSY STUDY OF 11 PATIENTS UTILIZING PLASTIC-EMBEDDED TISSUE. (E.)

Callahan, W. P. (U. Florida Sch. Med., Gainesvill R. L. Hackett and A. E. Lorincz. Arch. Path. (Chicago) 83(6):507-512, 1967.

Menghini needle liver biopsy specimens from patients with Hurler's syndrome (lipochondrodystrophy or gargoylism) were evaluated by light microscopy, using 0.5 μ-2.0 μ thick, osmium-fixed, plastic-embedded sections as well as routinely processed paraffin tissue. Observations of the liver in Hurler's syndrome demonstrated the following characteristic features: diffuse, discrete vacuolization of hepatocytes; variation in vacuole size, the largest being in periportal areas; vacuolar involvement of the Kupffer cells; prominent sinusoids which are distended with a blue-gray substance demonstrable by toluidine blue staining; and the presence of intact mitochondria and nuclei. The greater resolution obtained by use of plastic embedded sections as an adjunct to examination of routine paraffin sections is emphasized as a valuable technic. Since a tissue specimen measuring only 0.125 mm^3 is required for plastic embedding, the method ideally accomodates the tissue obtained by needle biopsy technics.

8475 URINARY LIPASE EXCRETION IN PANCREATIC AND HEPATOBILIARY DISEASE. (E.)

Pfeffer, R. B. (New York U. Med. Ctr., N. Y.),

hman, T. Cohen, M. Tesler and A. R. Aronson.
Gynec. Obstet. 124(5):1071-1074, 1967.

y lipase excretion (secretin stimulated)
termined in 12 normal controls and in 113
ts who had jaundice or suspected pancreatic
matory disease or cancer; the second group
jects included 9 with established chronic
atitis and 11 with acute viral hepatitis.
normals, after secretin stimulation, there
rise in urinary lipase to an av. value of
/ml (range 0.32-1.7 U/ml), usually in the
r. postinj. period. In 17 patients with
oma of the body and/or tail of the pancreas,
-hr. urinary lipase excretion curve was
ally low in 15 and normal in 2. In 22
ts with chronic recurrent pancreatitis, the
was abnormally low in 20 and normal in 2.
patients with obstructive jaundice, the
as abnormally low in 35 and normal in 12.
patients with acute viral hepatitis had
curves. In 9 other patients with other
y-pancreatic disease, there were 2 with
pancreatitis (1 abnormally low curve 5
fter admission), 3 with pancreatic pseudo-
(1 abnormally low curve) and 1 with acute
with chronic cholecystitis, all with normal
. Seven of 8 patients who were not jaundiced
o were suspected of having malignant disease
pancreas had normal urinary lipase excre-
urves. Serum amylase levels in fractional
s of blood done simultaneously showed no
ation with urinary lipase values. It is
ded that, within certain limitations, the
urinary lipase excretion test is an adjunct
diagnosis of pancreatic carcinoma.

STUDIES ON THE PATHOGENESIS OF TETRACYCLINE-INDUCED FATTY LIVER. (E.)
, M. (U. Texas Southwestern Med. Sch.,
), S. Schenker and B. Combes. Amer. J.
Dis. 12(5):429-438, 1967.

ant and nonpregnant female rats were infused
tetracycline (10 mg/100 g) daily for 3 days.
at time, mean total hepatic lipid and tri-
ride conc. for the tetracycline-inj. non-
ant and pregnant rats were significantly
r than control values. The total lipid and
yceride levels, as well as plasma decay rates
epatic conc. of tetracycline, were comparable
tetracycline-inj. nonpregnant and pregnant
Hepatic ATP levels were normal in animals
tetracycline for 3 or 7 consecutive days
ll as in those studied during max. hepatic
cycline conc. It is concluded that in the
tetracycline-induced fatty liver is not
ted via hepatic ATP depletion; large doses
tracycline are metabolized comparably and
t in a similar increase in hepatic lipid in
ant and nonpregnant animals.

CERULOPLASMIN IN WILSON'S DISEASE. (E.)
Holtzman, N. A. (Johns Hopkins U. Sch.
Baltimore, Md.), M. A. Naughton,
F. L. Iber and B. M. Gaumnitz. J. Clin. Invest.
46(6):993-1002, 1967.

In a 31-yr.-old man with hepatolenticular degeneration, hepatic fibrosis and elevated liver and urinary Cu, the serum ceruloplasmin activity was normal (25 mg%) and crystallized serum ceruloplasmin showed no significant structural differences from that derived from normal controls. No abnormalities were detectable in terms of the tryptic peptide map, electrophoretic analysis or determinations of amino acid and sugar composition. Treatment with D-penicillamine (1 g/day) increased cupuresis from 400-4502 µg/24 hr. within 2 days; after 3.5 mo. of treatment, serum ceruloplasmin had fallen to 8 mg% and none was detectable 3 mo. later. The patient was sufficiently improved after 10 mo. of treatment to withdraw from therapy. Approx. 1 yr. later, when incipient recurrence of tremor occasioned another consultation, serum ceruloplasmin had reappeared, at a level of 4 mg%. Electrophoretic studies of partially purified serum ceruloplasmin from another patient with Wilson's disease, in whom the level was persistently low, were also entirely normal. Following an unspecified period of treatment, when penicillamine was withdrawn for 3.5 mo., serum ceruloplasmin rose from less than 2.0 to 6.5 mg% in the case of the second patient. It is concluded that the first patient's reaction to prolonged treatment with penicillamine may have resulted from a diminished sensitivity of the ceruloplasmin-synthesizing system to Cu.

8478 IDIOPATHIC RECURRENT CHOLESTASIS. (E.)
Stathers, G. (U. Sydney, Australia),
C. S. H. Reed and E. Hirst. Gastroenterology
52(3):536-543, 1967.

A 32-yr.-old woman is described who had obstructive jaundice at 19 yr., with further attacks at 27 and 31 yr. These attacks were marked by severe pruritus and lasted from 6-24 mo. Serum transaminases were markedly elevated. Laparotomy after the first attack showed a microscopically normal liver; there were no calculi in the common bile duct or gallbladder; some recent adhesions were noted around the gallbladder. Another laparotomy was performed after 8 yr., 2 mo. after a 10-day period of jaundice at the end of her first pregnancy; the common bile duct and gallbladder were opened and found to be empty and free from obstruction; the liver appeared cirrhotic and a liver biopsy was taken; there were some enlarged lymph nodes at the hilum of the liver, and some adhesions were present around the common duct; the pancreas, stomach, and duodenum were normal. Jaundice worsened after 2 days and hydrocortisone therapy was begun; after the immediate postoperative period, prednisone was begun at 60 mg daily; at discharge after 2 mo., prednisone was reduced to 30 mg daily; this was further reduced until a maintenance dose of 5 mg daily was reached after 5 mo.; this was discontinued after 4 mo.

Later liver biopsies were normal. The syndrome is preferably named "idiopathic recurrent cholestasis", and the features in this patient suggest an atypical recurring hepatitis.

8479 BILE DUCTULES IN CHOLESTASIS: MORPHOLOGIC EVIDENCE FOR SECRETION AND ABSORPTION IN MAN. (E.) Sasaki, H. (Mt. Sinai Sch. Med., New York, N. Y.), F. Schaffner and H. Popper. Lab. Invest. 16(1):84-95, 1967.

Both light and electron microscopy showed the presence of bile in the cytoplasm of ductular cells in biopsy samples derived from patients with extra- or intrahepatic cholestasis. Pinocytotic vesicles, also seen occasionally on the luminal cell surfaces in specimens from normal controls, were much increased in number and size and were found chiefly on the lateral and basal cell surfaces. Their presence on lateral surfaces was associated with separation of the basal halves of neighboring cells. Their presence on basal surfaces was associated with reduplication of the basement membrane and periductular fibrosis. These phenomena appeared to suggest that, in cholestasis, the movement of the vesicles was in a luminal-to-lateral and basal direction. Pinocytotic vacuoles were also found in the vicinity of and within multivesicular bodies in the supranuclear region, appearing to offer additional confirmation of the presence of an absorption process. Hyaloplasmic projections from the lateral surfaces appeared to indicate water transport across the cell membrane in this region, as did complex enfolding of basal cell surfaces and much increased interdigitation of lateral surfaces at the basal halves of the cells. Material with density similar to that of basement membrane was found in both basal and lateral intercellular spaces, apparently discharged from the epithelial cells by reverse pinocytosis and transported to an area close to the basement membrane, in whose reduplication it participated. There was no evidence of obstruction to the flow of bile through the ductules and no qualitative electron microscopic differences were found which could distinguish between intra- and extrahepatic cholestasis. In samples derived from patients with cirrhosis of the liver, without cholestasis, marked proliferation of ductular cells was in evidence, but enlarged pinocytotic vesicles were most numerous on luminal, as contrasted to basal or lateral, cell surfaces; the basal halves of lateral surfaces were interdigitated normally; basement membrane was not reduplicated and the ductules themselves were composed of flatter epithelium surrounding a narrower lumen. It is concluded that both secretion and absorption appear to take place in human bile ductules, with absorption increased significantly in the presence of cholestasis.

8480 ANTIGEN DELETIONS IN CARCINOGEN-INDUCED RAT HEPATOMATA. (E.) Baldwin, R. W. (U. Nottingham, England) and C. R. Barker. Nature (London) 214(5085):292-293, 1967.

Tumors were induced in inbred Wistar rats by continuous p.o. admin. of carcinogens. 4-Dimeth aminoazobenzene (0.06%) was fed in a low protein rice diet for 3 mo., followed by a basal ri diet for 2-3 mo.; 2-acetamidofluorene (0.04%) was admin. in a standard diet, and hepatoma developed regularly in males in 7-9 mo.; diethyl nitrosamine (1.5 mg daily) was admin. in drinkin water until tumors developed, after approx. 6 mo Primary tumors and normal rat livers were perfused in situ. Tumors were transplanted into isogeneic rats of the same sex as that of the primary host. Tissues were fractionated into soluble proteins (cell sap) and microsomes by ultracentrifugation; rabbits were immunized with normal rat liver fractions; immunodiffusion analyses were made in Petri dishes. Rabbit anti sera were exhaustively absorbed with normal rat serum before use. Protein contents of tissue fractions were normalized. Agar gel double diffusion analyses of soluble cell sap fractions fr 5 transplanted 4-dimethylaminoazobenzene-induced hepatomas showed that in every case 3 major norm liver antigens were deleted; these 3 were not detected in diethylnitrosamine tumors; 2 of 3 were deleted in 2-acetamidofluorene induced tumors. The qualitative nature of these alterations was confirmed by the use of agar gel plates into whi 2 mg/ml tumor cell sap was incorporated. Analys of deoxycholate solubilized tissue microsome fractions also revealed deletion of 3 of 5 detectable normal liver antigens in all 5 4-dimeth aminoazobenzene-induced hepatomas. Fewer normal liver antigens were deleted from primary tumors (although the quantities were lower than in normal liver) when compared with tumors which had been passaged for only a few generations. While individual tumors showed a varying pattern of ant gen deletion, there was a common group of antigen from which deletion occurred in the whole range of primary and transplanted tumors, irrespective of carcinogenic agent. The findings warrant further study of the influence of hepato-carcinogenic agents on the cell surface antigens of bot liver and induced tumors.

8481 OXYHEMOGLOBIN DISSOCIATION IN PATIENTS WITH HEPATIC ENCEPHALOPATHY. (E.) Zimmon, D. S. (Roy. Free Hosp., London). Gastroenterology 52(4):647-654, 1967.

The controls (Group 1, 7) consisted of 5 hospital patients without clinical, laboratory, or historical evidence of hepatic, cardiac, pulmonary disease and 2 studied while jaundiced as a result of extrahepatic biliary tract obstruction. Nine patients with cirrhosis were divided into 2 group according to the presence (Group 2, 4) or absence (Group 3, 5) of encephalopathy. Studies were made after an overnight fast and included pO_2, pCO_2, pH, whole blood O_2 content and capacity. When compared with the controls or with the norma curve of Severinghaus, Group 2 showed a slight, statistically insignificant right shift of the oxyhemoglobin dissociation curve (av. -0.64). Eleven determinations in Group 3 showed a

icant right shift (av. -3.26) when compared
mal controls or cirrhotic patients without
alopathy. These patients demonstrated the
atory alkalosis associated with hepatic
a or coma. There was no correlation between
gree of hypoxemia and the right shift of
ssociation curve. No abnormal hemoglobins
be demonstrated in Group 3. The correlation
isorder of oxyhemoglobin dissociation with
c encephalopathy suggests that the liver
e way maintains the functional integrity
oglobin and perhaps other respiratory pro-

STUDIES ON THE INTRACEREBRAL TOXICITY
OF AMMONIA. (E.) Schenker, S. (U.
Southwestern Med. Sch., Dallas), D. W.
less, E. Brophy and M. S. Lewis. J. Clin.
. 46(5):838-848, 1967.

major sources of intracerebral energy,
ine triphosphate (ATP), phosphocreatine,
ucose, as well as glycogen, were assayed in
cortex and base of rats given ammonium
e with resultant drowsiness at 5 min. and
uent coma lasting at least 30 min. Cortical
d phosphocreatine remained unaltered during
ion of coma. By contrast, basilar ATP,
lly 1.28 μmoles/g, was unchanged at 2.5 min.
ll by 28.1, 27.3, and 26.6% at 5, 15, and
. after ammonium acetate. At comparable
basilar phosphocreatine fell more strik-
by 62.2, 96, 77.1, and 71.6% from a control
of 1.02 μmoles/g. These basilar changes
not be induced by anesthesia, psychomotor
lation, or moderate hypoxia and were not due
creased accumulation of ammonia in the base.
se and glycogen conc. in both cortex and
fell significantly but comparably during
pment of stupor, and prevention of the
ral glucose decline by pretreatment with
se did not obviate ammonia-induced coma
e basilar ATP fall. These findings represent
irst direct evidence that toxic doses of
ia in vivo acutely affect cerebral energy
olism and that this effect is preferentially
ized to the base of the brain.

ACUTE HEPATIC COMA TREATED BY CROSS-
CIRCULATION OR EXCHANGE TRANSFUSION.
Burnell, J. M. (U. Washington Sch. Med.,
le), J. K. Dawborn, R. B. Epstein, R. A.
n, G. E. Leinbach, E. D. Thomas and W.
ler. New Eng. J. Med. 276(17):935-943, 1967.

cases of acute massive hepatic necrosis
severe coma are described: 3 patients were
ed by cross-circulation, 2 by exchange trans-
n. In the first case an exchange of a total
0 liters of blood with the patient's mother
factorily alleviated coma, but the patient
quently died of gastrointestinal hemorrhage.
e second, inefficient exchange of a total
liters of blood with a volunteer patient
carcinoma did not alleviate coma, and the
patient died. In the third, exchange of a total of 190 liters of blood, first with the patient's husband and then with her father, during 15 occasions over a 10-day period alleviated coma and allowed eventual complete recovery of the patient. The cross-circulation partners experienced a variety of reactions, but no late sequelae have been observed. In the fourth, exchange transfusion of 30 liters of blood during 5 days did not alleviate coma, and the patient died. A fifth case with viral hepatitis and coma was treated with 13 exchange transfusions over a 10-day period, with alleviation of coma, but the patient died of progressive hepatic disease. It was concluded that a judicious use of exchange transfusion of cross-circulation may prove advantageous in carrying patients through a period of hepatic coma when eventual recovery is expected.

8484 THYROID RADIOIODINE UPTAKE IN HEPATOSPLENIC SCHISTOSOMIASIS. (E.) Parthemore, J. (Edgard Santos Hosp., Bahia, Brazil), M. Carvalho, B. Vianna and E. D. Furth. Rev. Inst. Med. Trop. S. Paulo 9(2):79-83, 1967.

8485 HISTOPATHOLOGICAL, BIOCHEMICAL AND SEROLOGICAL CORRELATION OF LEPTOSPIRAL HEPATITIS. (PRELIMINARY REPORT). (E.) Chitchang, S. (Army Inst. Path., Bangkok), U. Tuchinda, B. Sundharagiati and C. Harinasuta. J. Med. Ass. Thailand 49(11):813-817, 1966.

8486 ETIOPATHOGENESIS OF PRIMARY IDIOPATHIC HEMOCHROMATOSIS. (Ger.)(Rev.) Schnack, H. (U. Clin. Vienna). Wien. Klin. Wschr. 79(7):113-127, 1967.

8487 TECHNICAL PROBLEMS AND RESULTS OF HETEROTOPIC LIVER TRANSPLANTS IN THE DOG. 35 CASES. (Fr.) Romieu, C. (Fac. Med., Montpellier, France), G. Marchal, C. Solassol, M. Bousquet, M. Balmes, H. Michel and G. Olivier. Bordeaux Chir. (1):38-45, 1967.

8488 THE HISTORICAL BACKGROUND OF LIVER RESEARCH. PART I. THE ANTECEDENTS ON ANATOMY, PHYSIOLOGY AND PATHOLOGY OF THE LIVER IN ANTIQUITY. (Ger.) Mani, N. Basler Veroffentl. Zur Geschichte der Medizin und der Biologie 9, 1967, 109 pp., Schwabe & Co., Basel.

8489 THE HISTORICAL BACKGROUND OF LIVER RESEARCH. PART II. THE HISTORY OF LIVER RESEARCH FROM GALEN UNTIL CLAUDE BERNARD. (Ger.) Mani, N. Basler Veroffentl. Zur Geschichte der Medizin und der Biologie 21, 1967, 649 pp., Schwabe & Co., Basel.

8490 BIOLOGIC SYNDROME OF HEPATIC INFILTRATION DURING LEUKEMIA AND ANGIOSARCOMA.

(Fr.) Erlinger, S. (Paul Brousse Hosp., Paris), C. Bohuon, R. Gérard-Marchant, A. M. Méry and G. Mathé. Bull. Soc. Med. Hop. Paris 118(5):427-434, 1967.

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INTERFERENCE WITH BILE PIGMENT UPTAKE IN THE LIVER BY FLAVASPIDIC ACID. (E.)

er, L. (U. California Med. Ctr., San
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1967.

spidic acid, a phloroglucinol derivative
ned from male fern (*Dryopteris felix-mas*),
es unconjugated hyperbilirubinemia and
ased retention of BSP. The mechanism of
transient hepatic dysfunction was studied
le Sprague-Dawley rats (prepared with an
nal bile fistula) which were infused with
ubin (500 μg/ml), conjugated bilirubin
g/ml) or ^{3}H-mesobilirubinogen (444 μg/ml)
nstant rates of 1 ml/hr. for 10 consecutive
Approx. 6 hr. after beginning the infusions,
gle dose of neutralized aqueous flavaspidic
N-methylglucaminate (0.05 mmole/kg) was
i.v. There was abrupt, but transient,
ssion of biliary excretion of the 3 tetra-
les, concomitant elevation of their plasma
, and establishment of a new "steady-state"
patic pigment transfer characterized by
n of biliary excretory rates to preinj.
s at increased plasma conc. Since
spidic acid affects to a comparable extent
ic transport of tetrapyrroles that do or do
equire conjugation for biliary excretion,
redominant effect *in vivo* cannot be related
hibition of conjugation. In Gunn rats
miscible pigment pool had been labeled with
otopic tracer, flavaspidic acid displaced
of the intrahepatic bilirubin and released
to the circulation. A similar shift of
ubin from liver into plasma occurred in
rats, whose circulating pigment-binding
ity was acutely increased by infusion of
albumin. It is concluded that flavaspidic
affects hepatic transfer of bilirubin,
gated bilirubin and mesobilirubinogen by
ting for a shared mechanism of hepatic
e. The implications of this observation
he pathogenesis of human jaundice are
ssed in detail.

ANTIOXIDANT MAINTENANCE OF HEPATIC TRIGLYCERIDE SECRETORY ACTIVITY AND TIC FUNCTION IN CARBON TETRACHLORIDE POI- D RATS. (E.)

Crafton, C. G. (U. Tennessee
Units, Memphis) and N. R. DiLuzio. *Proc. Exp. Biol. Med.* 124(4):1321-1323, 1967.

Sprague-Dawley rats (125-225 g) were given
p. inj. of a corn oil suspension of the
oxidant, N,N'-diphenyl-p-phenylenediamine
mg/100 g). Controls received 2 inj. of an
valent vol. of corn oil. These inj. were
n 48 and 24 hr. before the p.o. admin. of
er undiluted CCl_4 or isotonic saline in a
of 0.25 ml/100 g. The animals were fasted
r. before p.o. intubation and received no
after treatment. Three hr. after CCl_4
n., Triton (p-iso-octyl polyoxyethylene phenol polymer) was admin. by tail vein in a dose of 50 mg/100 g as a 20% soln. (wt./vol.) in isotonic saline; controls received isovolumetric saline. In other experimental and control groups, the conc. of BSP in plasma was measured 10 min. after i.v. inj. of 50 mg BSP/kg body wt. The BSP was admin. 24 hr. after CCl_4. The prior admin. of the lipid antioxidant to rats which subsequently received CCl_4 p.o. prevented the CCl_4-induced depression of plasma triglyceride conc. and maintained a normal hepatic release of triglyceride into the plasma compartment, as assessed by the post-Triton hypertriglyceridemic response. Admin. of the antioxidant also prevented the CCl_4-induced impairment in the hepatic removal of BSP. These results, coupled with prior observation of inhibition of CCl_4-induced hepatic fatty infiltration, hepatic necrosis and lethality, indicate that antioxidants can modify the degree and nature of hepatic cell injury resulting from exposure to certain toxic substances.

8537 FINE STRUCTURE OF INTERPHASE LIVER CELL NUCLEI IN ACUTE ETHIONINE INTOXICATION.

(E.) Miyai, K. (U. Toronto, Ontario, Canada) and J. W. Steiner. *Lab. Invest.* 16(5):677-692, 1967.

A total of 87 white Wistar rats (46 males, 41 females) were divided into 4 groups. Group 1 received a synthetic diet consisting of casein (containing 3.5% methionine, so that methionine constituted 0.55% of the synthetic diet), 16.0%; corn oil, 5.0%; Jones Foster salt mixture, 4.0%; vitamin-sucrose mixture, 2.0%; and sucrose, 73%; the animals then received an i.p. inj. of 1 mg/g of 2.5% soln. of DL-ethionine in 0.9% saline. Group 2 received a regular diet consisting of Purina chow cubes, plus the same i.p. inj. of ethionine. Group 3 animals were fed the synthetic diet and some of them received an i.p. inj. of saline, while Group 4 animals received the regular diet, and some of them were given an i.p. inj. of saline. After sacrifice at various periods of time, liver sections from each group were studied under the light and electron microscope. Nuclear changes of rat liver cells in acute ethionine intoxication were observed from 15 min.-24 hr. after inj. In control groups, the nuclei of parenchymal cells were round or elliptical and measured 6.3-10.6 μ in diameter; approx. one-third of the hepatocytes were binucleated. The mean mitotic frequency in the parenchyma varied from 0.1-0.2%. No appreciable alteration in size or shape of nuclei occurred after admin. of ethionine; the proportion of binucleated cells and the mitotic frequency did not change. In both groups that received ethionine, the number of nucleoli per nuclear section tended to increase with progression of time, and this increase became statistically significant at the fourth hr. By electron microscopy, nucleoli showed progressive reduction in size, and dissociation and dispersal of their structural components. At later stages, the granular component of the nucleoli decreased, and ribosomes were fewer than normal in the cytoplasm and on the outer nuclear membrane. These observations suggest the presence of another mechanism, in addition to the inhibition of messenger RNA synthesis and a possible block in peptide chain initiation, by which protein synthesis is inhibited; ethionine may interfere with nucleolar function and thereby inhibit the synthesis of the precursors of ribosomes.

8538 PARTIAL HEPATECTOMY IN EXPERIMENTAL CARBON TETRACHLORIDE-INDUCED LIVER FIBROSIS. A HISTOLOGICAL AND BIOCHEMICAL STUDY IN RATS.

(E.) Olsson, R. (U. Goteborg, Sweden). Acta Chir. Scand. (Suppl. 366):3-85, 1966.

Liver fibrosis was induced in male rats by inj. of CCl_4 (0.1 ml/100 g body wt., admin. s.c. 3 times/wk.) for 4 mo. (Group 1), six mo. (Group 2) and 8 mo. (Group 3); in the latter 2 groups, inj. were given twice a wk. Biopsy sections obtained through laparotomy 1 wk. after CCl_4 was discontinued, showed that intoxication from 1 mo. of age during 8 mo. produced a liver fibrosis that was indistinguishable from that seen after 4 and 6 mo. of intoxication. Liver parenchyma displayed signs of liver cell degeneration as well as regeneration in all 3 groups. Liver hydroxyproline conc. was markedly elevated in all 3 groups. With minor exceptions, the DNA and RNA conc. were higher than normal in all 3 groups. A marked microscopic regression of fibrotic changes was seen in Groups 1 and 2 at 3 mo. and 3 wk., resp., after the intoxication procedure was discontinued. Regression consisted of a reduction in the thickness of trabeculae and in a decreased density of the trabecular network. In Group 3 signs of regression were uncommon 4 mo. and 3 wk. after cessation of the intoxication procedure. There was a reduction in the hydroxyproline conc. from biopsy to sacrifice in all 3 groups. Decreases noted in Groups 1 and 2 were dependent upon the initial conc. of hydroxyproline, the most pronounced reductions being observed in animals with the highest initial conc. of hydroxyproline. The decrease in Group 3 could not be correlated with a histological reduction in the relative amount of van Gieson-stained collagen fibers; this suggested the probability that the biochemical decrease in this group was a result of a decrease only in the alkali-soluble collagen. Fibrosis in Group 3 was considered irreversible, but that in Groups 1 and 2 was distinctly reversible. It was impossible to detect at biopsy any differences that could be used to predict reversibility or irreversibility of CCl_4 fibrosis. Transition to irreversibility was not reflected in hydroxyproline/DNA ratio, DNA conc., RNA conc. or RNA/DNA ratio in the biopsy specimens. Higher than normal liver wt. were encountered in all 3 groups. Pathologically elevated values of DNA and RNA conc. were found in Groups 1 and 3. Electrophoretic analysis of the serum proteins revealed low values for albumin, and inconstantly increased levels of α_1-, α_2-, and β_1-globulin. Removal of two-thirds of the fibrotic liver 3 wk. after discontinuance of th intoxication procedure was followed by a pronou proliferation of the liver remnant. In none of the groups was the liver wt. lower than normal mo. (Groups 1 and 2) and 4 mo. (Group 3) after surgery. Histologically, a decreased density o the trabecular network was usually observed mor frequently in the operated Group 2 and 3 animal than in the corresponding nonoperated animals. Defects in the trabecular network were commonly observed in animals from Groups 1 and 2. A decrease in hydroxyproline conc. was found in a groups of animals, but it was not always more pronounced than in the nonoperated animals. In all 3 groups, the reduction in hydroxyproline conc. was more pronounced at higher initial con of hydroxyproline, just as in the nonoperated Group 1 and 2 animals. The hydroxyproline conc at sacrifice was also consistently higher than normal in the operated animals. The abnormalit in liver RNA and DNA conc., observed in nonoper animals, were also encountered in partially hepatectomized rats. Hepatectomy was associate with an immediate mortality (day of operation a first postoperative day) of 7.6%; however, tota mortality did not exceed that in nonoperated animals. Partial hepatectomy did not influence serum protein abnormalities seen in the nonoper animals.

8539 SITE OF ACTION OF AFLATOXIN ON HUMAN LIVER CELLS IN CULTURE.

(E.) Zucker A. J. (London Sch. Hyg. and Trop. Med.), K. R. Rees, D. Inman and V. Petts. Nature (London) 214(5090):814-815, 1967.

Autoradiography investigations were made of the site of action of aflatoxin B_1 (from the Aspergi flavus-oryzae group) in human liver cells; titr tions of 3 aflatoxin fractions (purified crysta fractions B_1, G_1, G_2) were done. The fractions were dissolved in dimethyl formamide and dilute in 196 cultures of the liver cell growth medium Results showed that human embryo liver cells in culture incorporate uridine and thymidine, thus indicating that hepatic cells can synthesize RN and DNA. Low conc. of aflatoxin B_1 added to th cell culture inhibited nuclear RNA and DNA synt sis by the parenchymal cells. The authors conclude that the hepatotoxic action of aflatoxin on the human liver cell is similar to its actio on the rat liver cell, i.e., aflatoxin B_1 preve the production of messenger RNA, and perhaps prevents the RNA polymerase transcribing the DN molecule.

8540 SERUM PROTEIN AND CHOLINESTERASE CHAN IN ASSOCIATION WITH CONTRACEPTIVE PIL

(E.) Robertson, G. S. (Roy. Infirm., Aberdeen, Scotland). Lancet 1(7484):232-235, 1967.

In view of the similarity of metabolic effects between oral contraceptive therapy and pregnanc

ally involving liver damage, 4 oral prepara-
vere tested on 66 women between the ages of
44, divided into 2 groups: 33 women before
ll, at 1 mo. after starting treatment, and
o.; 33 women after taking the pill 12 mo.
ger. The pills were: Ovulen (ethynodiol,
nol), Ortho-Novin (norethisterone, mestranol),
trin (norethisterone, ethinylestradiol),
novlar 21 (norethisterone, ethinylestradiol).
cholinesterase level, serum-protein and
crit were determined. There was a general
rity of results in women under therapy for
with those under it for 1 yr. or longer.
gh the results do not indicate clinically
icant changes in liver function, there were
tions of a steroid-induced depression of
ver's ability to synthesize protein or to
e it into the circulation (which might be
reted as a stage before hepatocellular
).

SOME EFFECTS OF CHRONIC ETHANOL FEEDING ON VITAMIN B_6 DEFICIENCY IN THE RAT.

French, S. W. (San Francisco Gen. Hosp.,
) and J. Castagna. Lab. Invest. 16(4):526-
967.

c ethanol feeding worsened the deleterious
s of vitamin B_6 deficiency in rats by
sing the survival rate, increasing the
nce of acrodynia, and developing a fatty,
t a cirrhotic, liver. Possibly a longer
re to the dietary regimen is necessary for
velopment of cirrhosis, or the rat may not
vulnerable to vitamin B_6 as other species.
hydroxyphenylalanine decarboxylase activity
uced by ethanol activity; the activity of
nzyme was restored to near control levels
ition of pyridoxal-5-phosphate to the assay
This indicates that ethanol decreased the
activity by decreasing the conversion of
xine into the active coenzyme (pyridoxal-
phate) rather than by affecting the level
apoenzyme. The activity of glutamic-
c transaminase, a pyridoxal-phosphate
ent enzyme, was not influenced by ethanol
ion when the rats were fed diets supplemented
arious doses of pyridoxine chloride, which
tes that ethanol did not increase the
n B_6 requirements. Ethanol affects vitamin
abolism by nonspecific means which are yet
elucidated.

EVALUATION OF THE THERAPEUTIC ACTION OF PROTECTIVE SUBSTANCES ON THE LIVER.

Issekutz, L. (Med. U. Budapest).
mittelforschung 17(4):419-424, 1967.

od, devised to test compounds for protective
ty against hepatotoxic effects, is described.
160-180 g) of the same stock were 60%
ctomized and then exposed to a specific
of CCl_4 in the air breathed. Some were
d with the presumptive protective substance;
ls were given sham treatment. The amount
of protection is measured in terms of increased regeneration due to the inhibition of CCl_4 effects. To make the measurement, it is necessary to have a reliable index of regeneration. The usual value, g of regenerated liver tissue/100 g of body wt. at 10 or 21 days cannot be used: Increase in body wt. is almost completely inhibited by CCl_4 whereas, liver regeneration, although slower than normal, still proceeds; regeneration in CCl_4-treated animals seems to be more rapid than it actually is. The total liver is weighed when the animal is killed; the lobes removed at partial hepatectomy are weighed at that time. It is possible to calculate the residual liver at hepatectomy by the method of Brues et al. The degree of regeneration, expressed in per cent, is equal to g of regenerated liver tissue x 100 divided by the g of the excised lobes. Regenerated liver tissue is equal to liver wt. at death minus residual wt. Regeneration is slow at first but gathers momentum and is (for 60% hepatectomy) virtually complete in 21 days in normal untreated animals of medium wt. The degree of regeneration in per cent at 21 days in the controls was 98 (av. of 15 rats) and 83 (av. of 30 rats) for those treated with CCl_4. The BSP retention showed significant differences between the untreated and CCl_4-treated animals; these differences generally occurred throughout the 3-wk. period; the most marked difference was on day 21; the av. dye retention in CCl_4-treated animals (30) was 32.6%; the av. retention in untreated animals (15) was 2.7%. The degree of regeneration was increased and the dye retention decreased by liver protective compounds such as Ripason (a liver extract) in CCl_4-treated animals. Using the degree of regeneration, BSP retention and a number of other factors easily obtained, a formula was constructed which sharply reflects changes in the liver function of experimental animals. To obviate confusion, percentages are used as simple numbers. Degree of regeneration is used as 89 not 89%; if all animals survive in a group the figure used is 100 not 100%; if half survive the number is 50. The numerical value obtained from the formula is called the "regenerative value" (RV) by the author. This is the product of the degree of regeneration (say 89), the percentage of animals having normal liver function (BSP retention less than 5%) (say all, 100) and the percentage of animals still alive (say all, 100) divided by the av. percentage of dye retention by the group, (say 4) multiplied by 100. RV equals 89 x 100 x 100 divided by 4 x 100 equals 8900 divided by 4 = 2225. If the degree of regeneration is 83; half the animals have normal liver function, 50; all animals alive, 100; av. dye retention, 10; then RV equals 83 x 50 x 100 divided by 10 x 100 = 415. The highest possible value is about 3703.

8543 NEW STUDIES ON THE PREVENTION AND CURE OF EXPERIMENTAL HEPATIC DYSFUNCTION.

(E.) Rohn, S. (Solco Ltd., Basel, Switzerland), M. Kiraly and S. Neukomm. Arzneimittelforschung 17(1):47-49, 1967.

The controlled damage of mammalian liver by CCl_4 dosage to provide models upon which to test antitoxic properties of experimental drugs, leads to functional impairment in both animals and human liver. This causes biochemical changes, detectable by biopsy, or examination of blood or bile. Fifteen female rabbits (3 batches of 5 animals each), 30 female rats (3 batches of 10), and 48 mixed rats (3 batches of 10 females and 3 batches of 6 males) were subjected to CCl_4 damage. Specific liver tests (BSP, and electrophoresis determination of serum proteins) were done on these animals. Results showed that female rats are more resistant to CCl_4 than males, especially as seen in a less marked change in BSP retention and in albumin synthesis. β-Globulin increased in both sexes, but γ-globulin showed little change. The chronologic and quantitative changes observed occurred in the order: BSP > β-globulins > albumin. Liver extralyzate (aqueous extract plus hydrolyzate of mammalian liver containing neither anti-anemic principle nor proteins) normalizes BSP elimination and reduces serum protein changes; normalization was directly proportional to functional impairment.

8544 THE TOXICITY OF AJMALIN IN RATS WITH LIVER DAMAGE.

(Ger.) Sándor, P. (Med. U. Budapest), K. Szentágothai and A. G. B. Kovách. *Arzneimittelforschung* 17(5):618-619, 1967.

The LD_{50} (i.v.) for ajmalin, one of the Rauwolfia alkaloids, was determined using rats (150-200 g). With the thought that LD_{50} might be reduced among patients with liver damage, white rats were given 0.2 ml/kg of CCl_4 and paraffin oil mixed in equal quantities in one dose. Histological examination 24 hr. after receiving CCl_4 showed fatty infiltration and necrotic centers in the livers of the rats. Death rate was established at LD_{50} for rats with damaged livers. LD_{50} for normal rats was 30 mg/kg; at this dosage 66% of the rats with damaged livers were dead; these figures are significant. The presence of liver damage increased the lethality of ajmalin 15-16% on the basis of the number of animals in the test. The percentage of survivals was 30-32% greater among the animals without liver damage.

8545 THE PREVENTION OF FATTY LIVER BY ADMINISTRATION OF ADENOSINE TRIPHOSPHATE.

(E.) Hyams, D. E. (Harvard Med. Sch., Boston, Mass.), E. B. Taft, G. D. Drummey and K. J. Isselbacher. *Lab. Invest.* 16(4):604-615, 1967.

Three hepatotoxic agents, ethionine, the antibiotic azaserine and CCl_4, were admin. to female rats to study their effects on the liver. The 3 drugs produced a fatty liver associated with a rise in plasma free fatty acids, fall in ATP conc., inhibition of protein synthesis and decrease in lipoprotein synthesis. The ATP-depleting effect of ethionine was due to formation of S-adenosylethionine from ethionine and ATP; S-adenosylethionine accumulates in the liver, its production serves to trap the adenosine moiety of ATP and the ATP levels fall. ATP parenteral admin. after ethionine admin. had as a result the reversal of changes in both protein synthes and fat content of the liver. In cases of CCl_4 and azaserine, ATP inj. failed to decrease prot synthesis inhibition but fat accumulation in th liver was reduced or prevented. These agents produce a fatty liver by a mechanism not solely dependent on protein synthesis; hepatic protein synthesis may be inhibited despite adequate ATP conc. in the liver. ATP admin. causes a suppre sion of free fatty acids, which increase with admin. of the 3 hepatotoxic agents, thus preven ing hepatic lipid accumulation. This may be th main mechanism by which ATP prevents fatty live development.

8546 LIVER PARENCHYMAL CELL INJURY. V. RELATIONSHIPS BETWEEN PATTERNS OF CHLOROMETHANE-C^{14} INCORPORATION INTO CONSTITUEN OF LIVER *IN VIVO* AND CELLULAR INJURY.

(E.) Reynolds, E. S. (Peter Bent Brigham Hosp., Bost Mass.) and A. G. Yee. *Lab. Invest.* 16(4):591-6 1967.

Studies of the hepatotoxic effects of members o the chloromethane series on young male rats reveal that CCl_4 causes early centrilobular suppression of hepatic glucose-6-phosphatase ar transient intracellular Ca influx which is associated with centrilobular necrosis. Degra tion of the endoplasmic reticulum 2 hr. after the rats were fed 830-2600 μM chloromethane/10 g body wt. occurred, resulting in the doubling of the cell sap RNA content in the liver. This is due to the preferential incorporation of CCl_4 and chloroform into the lipid and protein constituents of the endoplasmic reticulum, the ability of these agents to disrupt the ribosome membrane of the granular endoplasmic reticulum and to cause eventual centrilobular necrosis (at 24 hr.). Reaction of chlorocarbon cleavage products of CCl_4 and chloroform with sulfhydryl groups of cysteine and homocysteine suggests th this may be one of the primary mechanisms of their hepatotoxic action. ^{14}C-Label from both CCl_4 and chloroform is recovered in an amino ac locus corresponding to methionine, while protei bound ^{14}C from dichloromethane, methylchloride and formaldehyde occurs at a locus correspondin to serine; bicarbonate-C fails to label those constitutents of the liver lipids and proteins labeled by the chloromethane carbon. The hypot sis that the relative chloroform and CCl_4 hepatotoxicity is due in part to the attack by their cleavage products on the granular endopla reticulum is supported by the shift in labeling patterns of the ribosomes and other chemical constituents of the cells, as lipids and amino acids, with increasing chloromethane chlorine content.

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n liver tissue was obtained during hepatic
gery and also by biopsy. Blood serum was
en from groups of fasting patients: (a) normal
jects, (b) patients with acute viral hepatitis
tages of onset and early illness, and (c)
ents with definite precoma or hepatic coma
owing acute hepatitis. After thorough washing
iver tissue with saline to remove RBC, and
genization, it was alternately frozen and
wed 3 times to break down the cells; the
pension was then treated 3 times with ultra-
nd at 20,000 Herz. After centrifuging, the
rnatant was dialyzed against 0.005 M buffer
H. 7.5. Serum was also dialyzed against the
type of buffer. Separation of the enzymes
first done on Sephadex columns and then by
trophoresis. Testing the separated enzymes
buffered substrates in the presence of malic
drogenase revealed the presence of 2 glutamic-
acetic transaminases in human liver tissue, one
rated from the cytoplasmic space, the other
ved from the mitochondria; the glutamic-
acetic transaminase from the mitochondria had
vity peaks at pH 6.0 and 7.6; the enzyme of
cytoplasmic space showed peak activity only
H 7.6. Electrophoresis caused the mitochondrial
me to migrate toward the anode and the cyto-
mic one toward the cathode. Normal serum has
low conc. of these enzymes that even chromatog-
hy or electrophoresis cannot accurately deter-
them. During virus hepatitis the serum levels
he enzymes increase to correspond to the liver
els of the 2 transaminases. In the course of
ssion the mitochondrial enzyme decreases more
dly than the cytoplasmic. In the beginning
ges of a liver coma after acute hepatitis both
saminases are present in serum; the mitochon-
al GOT is especially high. Ten days after a
episode, the mitochondrial enzyme had fallen
ne-third the cytoplasmic. The differential
ermination of these isoenzymes might serve as
seful index of the severity of viral hepatitis.

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od specimens from 84 patients (79 males, 5
ales) with Down's syndrome and from a control
up of 76 males with epilepsy were studied, as
l as those from 82 patients with polycythemia
a and others with other diseases, for the
sence or absence of Australia antigen (Au(1)).
omosome studies were performed on 17 patients
with Down's syndrome and 4 controls. Of 84 with Down's syndrome, 25 (29.8%) had detectable Australia antigen in their serum; this was the highest frequency found in any patient group so far tested. Four of 76 controls had Australia antigen. Five (10.4%) of 48 sera from patients suspected of having viral hepatitis were found to have Australia antigen. In addition, 1 of 2 patients with Fanconi's anemia and 1 of 12 with Hodgkin's disease had the antigen. Fourteen of 17 patients with Down's syndrome on whom chromosome studies were done were found to be trisomic for chromsome 21, the classical finding in this disease. Down's syndrome patients with Australia antigen had, on the av., a higher level of vitamin B_{12} than did those patients without this trait. Several hypotheses are discussed as an attempt to explain the various associations of Australia antigen with several disease states. Discovery of the frequent occurrence of Australia antigen in patients with viral hepatitis suggests the possibility that the agent present in some cases of this disease may be Australia antigen or be responsible for its presence.

8585 INFECTIOUS HEPATITIS. EVIDENCE FOR TWO DISTINCTIVE CLINICAL, EPIDEMIOLOGICAL, AND IMMUNOLOGICAL TYPES OF INFECTION. (E.) Krugman, S. (New York U. Sch. Med., N. Y.), J. P. Giles and J. Hammond. *J.A.M.A.* 200(5):365-373, 1967.

Serum from patients with infectious hepatitis was admin. p.o. (0.5-1.0 ml) or i.m. (0.10-0.25 ml) to noninfected subjects in 7 trials involving 54 institutionalized, mentally-retarded children, aged 3-10 yr., leading to identification of 2 distinctive forms of the disorder. Trial A involved 11 new admissions, treated p.o. with pooled serum from 27 patients; 10 of 11 infected. Trial B involved the 10 infected during Trial A, all of whom were treated i.m. from the same serum pool, 6 mo. later; 6 of 10 infected. Trial C involved 14 new admissions, 8 of 14 treated i.m. with serum from patients with Type I hepatitis and 6 of 14 kept in close contact with the treated subjects; 14 of 14 infected. Trial D involved 14 new admissions, 9 of 14 treated i.m. with serum from patients with Type II hepatitis and 5 of 14 kept in close contact with the treated subjects; 12 of 14 infected. Trial E involved 9 new admissions, 6 of 9 treated p.o. with serum from a patient with Type II hepatitis + γ-globulin (0.01 ml/lb., i.m.) and 3 of 9 kept in close contact, as above; 5 of 9 (all treated subjects) infected. Trial F involved 6 new admissions, all treated p.o. with serum from patients with Type II hepatitis, but without γ-globulin; 5 of 6 infected. Type I hepatitis resembled the classical picture of infectious hepatitis, characterized by a 31-42 (mean = 37) day incubation period, a 3-19 day period of abnormal serum transaminase activity, consistently abnormal thymol turbidity and a high degree of contagion.

Type II resembled the classical picture of serum hepatitis, with a 55-90 (mean = 71) day incubation period, a 35-155 day period of abnormal serum transaminase activity, normal thymol turbidity test. Type II was moderately contagious, and definitely infective p.o. As concerned Trials A and B, a careful comparison of incubation periods, thymol turbidity test results, etc., confirmed other evidence that homologous immunity followed infection with either Type I or Type II, with no evidence of the development of heterologous immunity, in either case.

8586 EFFECT ON THE INFECTIVITY OF VARIOUS VIRUSES BY THE INTESTINAL FACTOR OF NORMAL MICE WHICH INACTIVATES MURINE HEPATITIS VIRUS. (E.) Piazza, M. (U. Naples, Italy), G. Pane, L. Picciotto and D. Lombardi. Nature (London) 213(5073):293-294, 1967.

A method is described for the preparation of the factor, in the first section of mucosa of small intestine of adult mouse, which inactivates murine hepatitis virus (MHV-3). Small intestine of 30 g, 3-mo.-old mice was homogenized in 3 vol. of buffered saline, centrifuged at 30,000 times gravity for 1 hr. at 4° C and the sediment discarded; the supernatant was saturated with ammonium sulfate, the precipitate collected by centrifugation and dissolved in a minimal vol. of distilled water. The supernatant was dialyzed against 70% ammonium sulfate and the precipitate collected by centrifugation, dissolved in a minimal vol. of 0.05 M tris (2-amino-2-hydroxymethyl-1,3-propanediol)-HCl buffer pH 7.4, and dialyzed against this buffer. The partially purified factor was titrated: progressive dilutions of inhibitor (2 ml) were incubated for 2 hr. at 37° C in a water bath with an equal vol. of a suspension of MHV-3 containing 10^6 LD_{50}/0.1 ml. Groups of ten 4-wk.-old Swiss mice were inj. i.p. (0.2 ml) with each sample and the mortality recorded. One inhibitor U was the amount contained in the highest dilution which neutralized 10^6 LD_{50} MHV-3. Activity of inhibitor fraction on infectivity of various viruses was measured. A weak inhibitory effect was observed on the infectivity of influenza, measles, infectious bronchitis of chicken, coxsackie A-9, SV-40 and variola viruses. With the exception of rubella virus, the inhibitory effect seemed to be highly specific for murine hepatitis virus. No effect on the hemagglutinating activity of influenza and measles virus was observed when 1 U of inhibitor was tested against 4 hemagglutinating U of the resp. virus.

8587 THE EFFECT OF CORTICOSTEROIDS ON SERUM ASPARTIC AND ALANINE AMINOTRANSFERASES IN VIRAL HEPATITIS. (Pol.) Wysocki, J. (Inst. Infect. Dis., Acad. Med., Warsaw, Poland). Pol. Tyg. Lek. 21(49):1880-1882, 1966.

Aspartic aminotransferase activity and that of alanine aminotransferase was assessed in the sera of cortisone-treated (30 mg/day; 182 and 229 patients, resp., for each enzyme) and vitamin-treated (182 and 235, resp.) patients with viral hepatitis; the latter served as controls. Patier were subdivided according to age (4-18 yr., 19-60 yr. and over 60 yr.) and disease severity (slight 6 mg% or less of bilirubin, moderately severe, 6-12 mg%, and severe, more than 12 mg% of bilirubin). The corticosteroid treatment did not have any pronounced effect on the activity of these 2 serum enzymes.

8588 THE EFFECT OF CORTICOSTEROIDS ON SERUM ALDOLASE ACTIVITY IN VIRAL HEPATITIS. (Pol.) Wysocki, J. (Inst. Infect. Dis., Acad. Med., Warsaw, Poland). Pol. Tyg. Lek. 21(50): 1917-1919, 1966.

Serum aldolase was studied in 110 patients with viral hepatitis who were treated with cortisone (30 mg/day) and in 173 control patients who were treated with vitamins. Patients were subdivided according to age (4-18 yr., 19-60 yr., and more than 60 yr.) and severity of the disease (6 mg% of bilirubin or less, 6-1 mg% bilirubin and more than 12 mg% of bilirubin). In the doses used, the corticosteroids had no pronounced effect on serum aldolase activity in the patients with viral hepatitis.

8589 SEASONAL FACTORS IN THE EPIDEMIOLOGY OF VIRUS HEPATITIS. STATISTICAL RESEARCH. (It.) Rondanelli, E. G. (U. Pavia, Italy), P. Gorini, R. Moratti and G. Azzaretti. Minerva Med. 58(43):2002-2011, 1967.

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8593 ACTIVE SEARCH FOR VIRAL HEPATITIS IN A PRIMARY SCHOOL DURING AN EPIDEMIC. (Cz.) Hrachovina, V. (Infect. Clin., Most, Czechoslovakia), M. Mašková and Z. F. Zázvorka. Cesk. Pediat. 22(4):350-354, 1967.

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. Res. Inst.) and A. R. Reizis. Vop. Okhr.
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CTION IN CHILDREN WITH EPIDEMIC HEPATITIS.
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8605 THE SIGNIFICANCE OF DETERMINING THE CHOLESTEROL ESTERIFICATION INDEX FOR DETERMINATION OF THE SEVERITY OF INFECTIOUS HEPATITIS. (Rus.) Belov, G. F. (Novosibirsk Med. Inst., USSR). Vop. Med. Khim. 13(3):276-278, 1967.

8606 SERUM LIPOPROTEIN IN VIRAL HEPATITIS. (It.) Crosato, M. (U. Turin, Italy) and S. Cocuzza. Minerva Pediat. 19(7):305-307,1967.

8607 CHANGES IN THE CONGO RED-BINDING ABILITY OF SERUM PROTEINS IN INFECTIOUS HEPATITIS. (Ger.) Csögör, S. (Res. Ctr., Tirgu Mures, Rumania). Acta Hepatosplen. (Stuttgart) 14(3): 170-172, 1967.

8608 BLOOD PHOSPHATASE LEVELS IN VIRAL HEPATITIS. (It.) Castello, D. (U. Turin, Italy), G. C. Rosmino and C. De Sanctis. Minerva Pediat. 19(1):19-22, 1967.

8609 BLOOD PYRUVIC LEVELS IN VIRUS HEPATITIS IN CHILDREN. (It.) Rosmino, G. C. (U. Turin, Italy) and G. Baroncelli. Minerva Pediat. 19(12):519-522, 1967.

8610 LYSOSOMAL DAMAGE IN VARIOUS PHASES OF MOUSE VIRAL HEPATITIS. (E.) Di Simone, A. (U. Naples, Italy), R. Greco and M. Coltorti. Enzym. Biol. Clin. 8(3):215-227, 1967.

8611 FORMATION OF GIANT CELLS IN MOUSE MACROPHAGE CULTURES INFECTED WITH MOUSE HEPATITIS VIRUS (MHV-3). (Ger.) Laufs, R. (U. Freiburg/Br., Germany). Virchow Arch. Path. Anat. 342(2):169-183, 1967.

8612 REPLICATION OF AN ADENO-ASSOCIATED VIRUS IN CANINE AND HUMAN CELLS WITH INFECTIOUS CANINE HEPATITIS VIRUS AS A "HELPER." (E.) Smith, K. O. (NIH, Bethesda, Md.) and W. D. Gehle. J. Virol. (Baltimore) 1(3):648-649, 1967.

8613 ULTRASTRUCTURAL MODIFICATIONS INDUCED BY CANINE HEPATITIS VIRUS IN DOG KIDNEY CELLS. (Fr.) Matsui, K. (Cancer Res. Inst., Villejuif, (Valde Marne), France) and W. Bernard. Ann. Inst. Pasteur (Paris) 112(6):773-780, 1967.

8614 PLATELET AGGREGATION IN PATIENTS WITH LAENNEC'S CIRRHOSIS OF THE LIVER. (E.) Thomas, D. P. (Lemuel Shattuck Hosp., Boston, Mass.), V. J. Ream and R. K. Stuart. New Eng. J. Med. 276(24):1344-1348, 1967.

Platelet aggregation in response to adenosine diphosphate and thrombin was compared in normal subjects and in 20 patients with advanced Laennec's cirrhosis of the liver. In 9 cirrhotic patients with prolonged thrombin times and normal fibrinogen levels, platelet aggregation was significantly delayed in response to both adenosine diphosphate and thrombin, as compared to normal subjects. Plasma from an additional 6 patients with prolonged thrombin times, who were thrombocytopenic, delayed aggregation of platelets from normal subjects. It is suggested that circulating fibrinogen breakdown products, resulting from excessive fibrinolysis, are responsible for this impaired platelet aggregation in some cirrhotic patients. These findings indicate an additional cause for defective hemostasis in patients with cirrhosis of the liver.

8615 THE BLOOD VOLUME IN POST-NECROTIC CIRRHOSIS OF THE LIVER WITH SPLENOMEGALY. (E.) McFadzean, A. J. S. (U. Hong Kong) and D. Todd. Clin. Sci. 32(3):339-350, 1967.

In 30 patients with postnecrotic cirrhosis of the liver associated with varying degrees of splenomegaly, the RBC mass and plasma vol. were measured, resp., by ^{51}Cr-tagged RBC and Evans' Blue (T-1824). None had a reduced RBC mass; a low venous hematocrit, present in the majority of patients, was due to an increased plasma vol. In those with more than a minor degree of splenomegaly the body hematocrit:venous hematocrit ratio was raised, with 1 exception, to unity or above; the rise was proportional to the degree of splenomegaly. After splenectomy, the ratio fell to normal. The mixing curves of ^{51}Cr-tagged RBC within the spleen (in all but 1 of those with elevation of the body hematocrit:venous hematocrit ratio) had 2 components, 1 fast and the other slow. It was thought that a pool of blood of high hematocrit value within the spleen was responsible for the elevation of the body hematocrit:venous hematocrit ratio above the normal range. Fourteen patients, 10 of whom had body hematocrit:venous hematocrit ratios of unity or above, were restudied 2 yr. after splenectomy and the ratio in each was found to be below unity. An expanded plasma vol., present before operation in all but 2 of the 14 patients studied, persisted after splenectomy. In 5 it was reduced, but in 4 it had expanded further. An expansion of the RBC mass encountered in a number of patients after splenectomy was attributed to correction of hemolysis.

8616 ELECTROLYTE EXCRETION DURING THE SPONTANEOUS RECOVERY FROM THE ASCITIC PHASE OF CIRRHOSIS OF THE LIVER. (E.) Pecikyan, R. (Goldwater Mem. Hosp., Welfare Island, N. Y.), G. Kanzaki and E. Y. Berger. Amer. J. Med. 42(3):359-367, 1967.

Five patients are described who recovered from the edematous state of cirrhosis of the liver while on a liberal salt intake, without the use of diuretics. They received ordinary ward diets containing 50-150 mEq Na daily. Urine was collected daily, its vol. measured, and its Na and K content analyzed. The rate of natriuresis was calculated graphically. Ascites had been present for 4-11 mo., and the patients had required 4-14 paracenteses. Natriuresis began 1 mo. before recovery was clinically evident. The urinary Na excretion increased from less than 1 mEq to over 100 mEq daily. The rate of increase was striking constant, Na excretion doubling every 2.2-3.0 day During the 21-day period of natriureses, water excretion did not always increase. In 3, the correlation between the urine vol. and the day of the natriuretic period was not significant; in the other 2, the coefficients were significant, and the urinary vol. increased at a rate of 37 an 18 ml daily, resp. K excretion measured in 4 patients did not change during the natriuretic period. Urinary Na, water, and K excretion increased in the postnatriuretic period as compared to the prenatriuretic period. Following natriuresis, there was a small increase in the RBC count, hemoglobin conc., and serum albumin conc.; there was some decrease in WBC count, bilirubin conc., and BSP retention. Once the natriuresis was completed, ascites did not recur over a subsequent observation period of 3-7.5 yr., except in

8617 SERUM AND LYMPH LIPIDS IN RABBITS WITH CARBON TETRACHLORIDE-INDUCED CIRRHOSIS OF THE LIVER. (E.) Kotani, M. (U. Kyoto Med. Sch., Japan), K. Seiki, A. Yamashita, A. Takashima, T. Nakagawa and I. Horii. J. Lipid Res. 8(3):181-186, 1967.

Lymph flow and the composition of lymph lipids from the hepatic and thoracic ducts of rabbits with cirrhosis of the liver (induced by 46-51 i.m inj. of a mixture of CCl_4 and olive oil at 4-day intervals) are compared with those of control animals inj. with olive oil only. In cirrhotic animals, the conc. of lymph lipids was not greatl altered, but lymph flow (and consequently the hourly transport of lipids by lymph) was greatly increased; the increase in transport of cholester esters, free cholesterol, and phospholipids by way of the thoracic and hepatic duct lymph was particularly striking. The conc. of these lipid fractions in serum from the cirrhotic rabbits was also increased. The differences normally observed between lipid fatty acid compositions of serum and lymph disappeared in cirrhotic animals; this is interpreted as due to increased hepatic permeability to lipoproteins.

MACROGLOBULINS IN CHRONIC PANCREATITIS
AND LIVER CIRRHOSIS. COMPARISON WITH
JMATOID FACTOR MACROGLOBULIN. (E.)
N. (King Gustaf V Res. Inst., Stockholm)
Hedman. J.A.M.A. 200(11):951-960, 1967.

tation constants and hemagglutination titers
termined for serum samples derived from 10
s with chronic pancreatitis and 8 with
is of the liver, and samples were also
ed to cold precipitation, zone electro-
c and immunoelectrophoretic studies for
pose of comparing macroglobulins with the
oid factor macroglobulin, γM, whose sed-
ion constant lies between 18.2-18.8
g U. Pronounced macroglobulinemia (with
o to 13.6%) was found in patients with
pancreatitis, due primarily to an increase
acroglobulin, with γM increased to a much
degree or not at all. In patients with
is of the liver, a pronounced gammaglob-
a (with conc. up to 40.3%) was due pri-
to increase of a γ-globulin (γG) whose
tation constant was 6.5-7.0 Svedberg U,
eumatoid factor γM increased to a consider-
sser degree. It is concluded that the
positive sheep cell tests sometimes obtained
ents with chronic pancreatitis or cirrhosis
liver may be due to these secondary or in-
ent, relatively moderate increases of γM,
he macroglobulins which are increased most
cantly, in these disorders, belong to es-
ly different groups.

THE PASSAGE OF CEPHALOTHIN INTO AND
OUT OF ASCITIC FLUID. (E.) Wilson,
Tufts U. Sch. Med., Boston, Mass.), T. C.
s and M. A. Madoff. Amer. J. Med. Sci.
449-452, 1967.

ement of cephalothin (7-(thiophene-2-
do) cephalosporanic acid) into and out of
toneal cavity of 11 cirrhotic patients
cites was studied. Only 2 patients had
holic cirrhosis. Cephalothin, in 1-g
was admin. i.v. or i.p. in the course of
tic or therapeutic paracenteses. Blood
tic fluid were collected every hr. for
fter i.v. admin.; after i.p. admin., blood
d were collected at 1/2, 1, 2, 4, 6, 9,
24 hr. In both groups, urine was col-
for 24 hr. Antibiotic activity was de-
d by the cup-plate dilution method with
lutea, and 2-fold serial dilution with
ococcus 209-P. Results showed that i.v.
gave higher serum levels at 1 hr. than did
nin., but there was no difference in anti-
levels at 2 and 4 hr., although i.p. admin.
measurable serum activity for a longer
of time. After i.v. admin., approx. 77%
total drug was recovered from the urine
the first 24 hr., with 67% excreted during
st 6 hr. After i.p. admin., 55% was ex-
in 24 hr., with 28% after the first 6 hr.
pain, side reactions, or liver or renal
n changes were noted.

8620 THE RELATION OF CIRRHOSIS OF THE LIVER TO RENAL HYPERTENSION. A REVIEW OF 639 AUTOPSIED CASES. (E.) Schwartz, D. T. (Columbia-Presbyterian Med. Ctr., New York, N. Y.). Ann. Intern. Med. 66(5):862-869, 1967.

Among 14,448 autopsies performed at St. Luke's Hospital from 1950-1964, and at Columbia-Presbyterian Medical Center from 1932-1964, inclusive, there were 675 cases of liver cirrhosis: 435 (66.6%) had Laennec's cirrhosis, 100 (15.3%) had postnecrotic cirrhosis and 75 (11.4%) had biliary cirrhosis. An associated hepatoma was found in 44 cases. Complete analysis of 639 case records revealed that 381 (59%) had esophageal varices. The incidence of diastolic arterial hypertension was 8%, while an additional 5% had a history of hypertension that disappeared with the development of cirrhosis. The course of arterial blood pressure differed according to the presence or absence of renal disease. Among those cases without renal disease, arterial hypertension was rare and was not altered by the development of cirrhosis. Among those with renal disease, sustained arterial hypertension was reversed with development of appreciable portal-systemic shunting, as evidenced by demonstrable esophageal varices, but was not reversed in the absence of varices. The disappearance of hypertension was not related to the serum albumin:globulin ratio or to the development of ascites. Protection against arterial hypertension in those with renal disease who developed varices was lost when an end-to-side portacaval shunt was made. The mechanism of this protection against hypertension is unknown, but it is suggested that portal venous blood contains a substance which inhibits the synthesis of hepatic angiotensinase and that this substance is diverted from the liver in subjects with esophageal varices. The reversal of flow in the portal vein is thought to be necessary for this process, and it is suggested that end-to-side portacaval shunt involves some risk of leading to arterial hypertension in the treatment of patients with known renal disease.

8621 ATHEROSCLEROSIS IN PATIENTS WITH LIVER CIRRHOSIS. (Rus.) Loginov, A. S. (Miasinkov Inst. Ther., Moscow) and I. I. Iutanova. Kardiologiia 7(4):29-33, 1967.

8622 VASCULAR CHANGES IN THE PORTAL VENOUS SYSTEM IN LIVER CIRRHOSIS. (Rus.) Pkhakadze, G. A. (Tbilisi Med. Inst., USSR) and L. S. Rubetskoi. Eksp. Khir. Anest. 12(3):31-34, 1967.

8623 GLUCOSE REGULATION IN HEPATIC CIRRHOSIS. (It.)(Rev.) Bianchessi, M. (U. Milan, Italy) and R. Milani. Rass. Clin. Sci. Ist. Biochim. Ital. 43(4):104-116, 1967.

8624 DETERMINATION OF A LOW SERUM CERULOPLASMIN LEVEL IN THREE PATIENTS WITH NON-WILSONIAN HEPATIC CIRRHOSIS. (It.) Brusa, L. (U. Turin, Italy), A. Cravario and P. G. De Filippi. Boll. Soc. Ital. Biol. Sper. 43(4):202-204, 1967.

8625 FAMILIAL PROGRESSIVE POLIODYSTROPHY WITH CIRRHOSIS OF THE LIVER. ([illegible].) Wefring, K. W. (U. Bergen, Norway) and J. O. Lamvik. Acta Paediat. Scand. 56(3):295-300, 1967.

8626 TREATMENT OF THE WATER-SALT RETENTIO SYNDROME IN CIRRHOSIS. (Fr.) Berni J. J. Concours Med. 89(23):4561-4567, 1967.

8627 USE OF ETHACRYNIC ACID AND THE COMBINATION OF ETHACRYNIC ACID AND LACTONES IN CIRRHOSIS AND THE JAUNDICE OF CIRRHOSIS. (Fr.) Varay, A. (38 Ave. Hoche, Paris), A. Castel and J. D. Rain. Presse Med. 75(13):659-662, 1967.

See also abstract no.: 7748

CHOLEDOCHOTOMY IN NONMALIGNANT DISEASE
OF THE BILIARY TRACT. (E.) Glenn, F.
rk Hosp.-Cornell Med. Ctr., New York,
Surg. Gynec. Obstet. 124(5):974-988, 1967.

a 33-yr. period, 1078 patients were sub-
to common duct exploration in search of
. During this same period, a total of
tients were operated upon for nonmalignant
of the biliary tract. Of 4677 who were
d upon for nonacute cholecystitis, usually
ted with gallstones, 694 (15%) were also
ed to common duct exploration in search of
; calculi were removed from 416 (8.8%).
tality rate for those who underwent ex-
on combined with cholecystectomy was 4.3%.
ority of patients explored (428) and the
y of those who had calculi removed (276)
yr. of age and older. The mortality rate
se 50 yr. of age and older was 6.1%, com-
o a 1.5% mortality rate for those under
During the same period, 172 patients of
erated upon for acute cholecystitis were
ed to common duct exploration; calculi
noved in 101, an incidence of 7.5%. The
ty rate for those undergoing cholecystectomy
ledochotomy was 5.4%. There were 212
s upon whom choledochotomy was performed
condary procedure for the manifestations
on duct obstruction associated with calculi.
were removed in 154 (72%); mortality rate
%.

EXPLORATION OF THE COMMON BILE DUCT WITH
VAN BUREN SOUNDS. (E.) Meyerowitz,
lbert Einstein Sch. Med., Bronx, N. Y.).
Surg. 113(6):861, 1967.

Buren urethral sound is said to be widely
Great Britain for exploration of the
ile duct and is also said to be more ad-
us for this purpose than the Bakes'
which is employed in the United States.
Buren sound offers the surgeon a better
gives him better control of the instru-
t is also in contact with the full length
uct at one and the same time, whereas the
ilator can contact only one segment at a
n addition to use of the sound as an
ory instrument, it is said to simplify
denal sphincterotomy by allowing the
to cut down on it while it is held firmly
with its tip protruding through the
of Vater.

EXPOSURE OF INTRAHEPATIC BILE DUCTS
THROUGH INTERLOBAR FISSURE. (E.)
W. R. (U. Colorado Med. Sch., Denver).
nec. Obstet. 124(3):491-500, 1967.

ients with various forms of bile duct
(severe cholestasis, biliary cirrhosis,
titis, jaundice, portal hypertension)
are described in whom the major intrahepatic bile ducts were exposed by separation of the lobes of the liver through the avascular interlobar plane. In each there was no other method of access to intrahepatic ducts for correction of stenotic lesions or anastomosis to the intestine. This simple, straightforward anatomic approach allows exposure and accurate anastomosis between either the proximal portion of the common duct or the major radicles and the intestine, or the distal common duct remnant. A Roux-en-Y of jejunum was utilized in 2 of 3 patients requiring replacement of the common duct, and the duodenum was used in the third. In 1 patient, no part of the common bile duct could be found and only a temporary external biliary fistula was formed; subsequently, an internal fistulous connection between the liver and the duodenum developed spontaneously which allowed him to live fairly well for 9 subsequent yr. despite the development of advanced biliary cirrhosis. In one patient, a collar of heavy fibrous tissue surrounded the common bile duct inside the liver, and the direct approach which has been described facilitated surgical management of his condition. In the 11-yr.-old boy, a technically difficult situation accrued from a gunshot wound, previous operations, advanced biliary cirrhosis and portal hypertension; in spite of all of this, the intrahepatic main bile ducts were exposed and anastomosed to the duodenum by way of separation of the lobes of the liver through the avascular interlobar plane. It is concluded that the procedure described is merely application of anatomy to the soln. of difficult and unusual problems occasionally encountered in biliary tract surgery.

8631 JIRGL'S REACTION AND WUANI'S (LATEX) TEST IN THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE. (Sp.) Ferreira, E. B. (Fac. Med., Porto Alegre, Brazil). Prensa Med. Argent. 53(36):1943-1950, 1966.

The Jirgl and Wuani tests were each performed on 20 jaundiced patients. A positive Jirgl reaction was found in 11 cases (6 with cholestasis and 5 with complete obstruction). A negative Jirgl reaction was noted in 9 cases (1 hemolytic jaundice, 7 hepatocellular and 1 obstructive). A positive Wuani (latex) occurred in 8 cases (5 hepatocellular, 1 cholangiolitic and 2 complete obstruction). A negative Wuani test was found in 12 cases (1 hemolytic, 2 hepatocellular, 1 intrahepatic cholestasis, 4 extrahepatic and 4 complete obstruction). Sixty healthy subjects and 60 nonjaundiced patients with various disorders were tested. The percentage of positive Jirgl and Wuani tests was recorded as follows:
1) hepatocellular jaundice, 0% and 71%, resp.;
2) obstructive jaundice (intrahepatic, cholestasis and posthepatic jaundice), 92% and 25%, resp.;
3) nonjaundiced patients, 8.3% and 13%, resp.;
and 4) healthy subjects, 1.7% and 5.0%, resp.
It is concluded that Jirgl's reaction, with its

high positivity (92%), is useful as an indication of the presence of obstructive jaundice; Wuani's test, although less positive (71%), appears to indicate the presence of hepatic injury (inflammatory or degenerative changes). Intrahepatic cholestasis, in turn, is said to be indicated when both tests are positive; extrahepatic cholestasis, when Jirgl's reaction is positive and Wuani's negative.

8632 NEW METHOD OF PALLIATION OF NEOPLASTIC OBSTRUCTIVE JAUNDICE. (E.) Tulcinsky, B. D. (Tel Aviv U. Med. Sch., Israel). Surgery 61(5):672-673, 1967.

Two cases of transtumor intubation of the common bile duct and 1 case of hepatojejunostomy are described. At surgery, a 62-yr.-old woman with obstructive jaundice was shown to have an infiltrating tumor of the common bile duct, patent only at its upper end. A stiff rubber tube (diameter 0.6 cm) was introduced through a high choledochotomy and advanced through the tumor into the duodenum; the choledochotomy was closed over its upper end in the patent portion. Jaundice regressed rapidly and there was no recurrence until death from cachexia after 8 mo. A 57-yr.-old woman showed a thickened gallbladder, metastases in the liver around the gallbladder area, invasion of the common duct. The gallbladder was removed with a large portion of the liver bearing metastases; a stiff rubber tube was advanced through the patent end of the common duct through the tumor into the duodenum. Jaundice and bile loss ceased within 3 mo. At laparotomy for pyloric obstruction after 9 mo., no metastases were found in the left side of the abdomen; a hard mass, probably neoplastic, on the right side was left untouched; the patient remains in good condition. Three others were similarly treated, with good results in all. In a patient with total occlusion of the extrahepatic ducts with considerable dilatation of the intrahepatic ducts, one end of a polyethylene tube was secured to a 3 mm-wide duct in the left lobe; the other end was inserted into a loop of the small intestine, brought up, and fixed to the liver. Jaundice ceased and the patient lived for 3 mo. Jaundice was relieved in 3 of 4 additional cases treated similarly. The palliative effects of the 2 procedures are stressed.

8633 MALFUNCTION WITHOUT CONSTRICTION OF THE COMMON BILE DUCT. (E.) Wyatt, A. P. (U. California Med. Ctr., San Francisco), F. O. Belzer and J. E. Dunphy. Amer. J. Surg. 113(5):592-598, 1967.

Nine goats survived 2 consecutive operative procedures for the production of traumatic stricture of the common bile duct, and in all cases a satisfactory lumen was restored. In 7, alkaline phosphatase and bilirubin levels were measured, and percutaneous cholangiograms were obtained by needle puncture of the gallbladder. The 7 were sacrificed at varying intervals; the other 2 are alive 6 mo. after operation; 6 of the 7 li for 10 wk. or longer before sacrifice. Alkali phosphatase rose after injury to the duct, fel to within normal limits after repair of the stricture and rose again within a few wk. to a new high. Recurrence of strictures was not ob served; on cholangiographic examination and at autopsy, the diameter of the strictured region of the duct was invariably greater than that f at the repair operation. End-to-end repair of the normal duct and patch grafting of the norm duct after excision of all but a thin posterio strip did not result in malfunction. Circumfe tial scarring, although not narrowing the duct may have interfered with intrinsic function. dogs, 2 silastic catheters were passed into th bile duct, 1 for a short distance upwards, the other downwards toward the sphincter of Oddi. Repeated experiments in which the pressure was raised and lowered in the upper bile duct and gallbladder gave no consistent results with pr sure of 0-30 cm water (or even up to 80 cm). When the fundus of the gallbladder was squeeze by closing the jaws of a hemostat on it, a def increase in flow through the sphincter of Oddi was observed, and the response increased with increasing closeness of the stimulus to the co mon duct. The positive responses obtained we 2- to 4-fold increases in flow, occurring wit 20-30 sec., and often lasting more than 1 min before flow returned to previous rate. Elect stimulation (10 volts at 5 pulses/sec., each 50 msec.) produced a response similar to that seen with the mechanical stimuli. The mechan of this response was nervous since it was abo by infiltration of 2% procaine around the com bile duct.

8634 BILIARY REACTION AND CHOLEDOCHOLITH INDUCED IN THE RAT BY LITHOCHOLIC A (E.) Zaki, F. G. (U. Minnesota Med. Sch., Minneapolis), J. B. Carey, Jr., F. W. Hoffbau and C. Nwokolo. J. Lab. Clin. Med. 69(5):737 748, 1967.

Male Holtzmann rats were divided into 4 group of 36 rats each according to the following di regimen: Group 1, laboratory chow (containin 20% crude protein and 2.5% fat) plus lithocho acid (25, 50 and 75 mg/rat/day) for 15 wk.; Group 2, a low protein diet (containing 6% ca and 6% alpha protein) plus lithocholic acid (75 mg/rat/day) for 15 wk.; Group 3, a low pr diet plus lithocholic acid as in Group 2, the the low protein diet without lithocholic acid for an additional 15 wk.; and Group 4, labora chow plus lithocholic acid (75 mg/rat/day) fo 7-10 wk., then the low protein diet plus lith cholic acid (75 mg/rat/day) for 8-15 wk. Six control animals for each group were fed the c responding diet without lithocholic acid. Se Group 1 animals were subjected to a two-third partial hepatectomy. The addition of lithoch acid to a low protein diet induced hydropic d generation of hepatic cells and an inflammato

on accompanied by ductular cell proliferation
xtended between portal spaces, linking them
er. The common bile duct became greatly
ed and filled with soft concretions which
hardened to form large stones; the mucosa
duct became hyperplastic. The stones were
ed mainly of lithocholic acid and its
lite, $3\alpha,6\beta$-dihydroxy-5β-cholanoic acid;
cter predominated in the stone and also ap-
in high conc. in the serum. All of these
s were reversed when lithocholic acid was
awn from the low protein diet, except for
rge gallstones which remained.

ACALCULOUS CHOLECYSTITIS. (E.)
Munster, A. M. (Peter Bent Brigham
Boston, Mass.) and J. R. Brown. *Amer. J.*
113(6):730-734, 1967.

cases of acalculous cholecystitis were
among 541 cases reviewed in an effort to
pathologic aspects, incidence, prognosis,
sociation with other disease, and to con-
improved management of the condition. The
es (6 men and 6 women), representing a 2.2%
nce, were the only ones to answer the
ia of selection: confirmed absence of
, and absence of biliary tract tumors. Con-
ble clinical and pathologic variation was
although the equal sex distribution followed
eported in the literature. An apparent
ation with other disease, especially pan-
tis, was noted. The 41% incidence of as-
ed disease (noted in liver biopsy) suggests
n acalculous cholecystitis the gallbladder
involved with more widespread disease. No
sion was reached concerning the advisability
oval of the acalculous gallbladder. It
ggested that postoperative morbidity might
roved by searching for hidden associated
ogy by: 1) intraoperative survey; 2) liver
; 3) choledochogram; 4) bacteriologic cul-
f the gallbladder wall; 5) stool cultures
lmonella typhi; 6) postoperative serial
tion of serum amylase, glucose tolerance
and perhaps a lupus erythematosus cell
ation; and 7) close follow-up.

PERSONAL EXPERIENCES WITH 1261 CASES
OF ACUTE AND CHRONIC CHOLECYSTITIS AND
LITHIASIS. (E.) Meyer, K. A. (Northwestern
d. Sch., Chicago, Ill.), N. J. Capos and
Mittelpunkt. *Surgery* 61(5):661-668, 1967.

ubjects were 1261 patients (788 women, av.
yr.; 473 men, av. 50 yr.) who underwent 1274
tions. .The number of patients and deaths
ch age group, resp., were: 10-20 yr. (21,0);
(65,0); 31-40 (116,0); 41-50 (306,0); 51-60
5); 61-70 (202,8); 71-80 (104,7); 81-90
); total 23 deaths (1.8%). The presenting
and symptoms consisted of pain, usually in
ight upper quadrant (72%); belching, food
erance (53%); nausea and vomiting (44%);
ry of jaundice (10%); fever and chills
(6.1%); asymptomatic (6%). In the 76 asymptomatics, gallstones were usually discovered on examination for an associated illness or as an incidental operative finding. Diagnosis was made most frequently by oral cholecystogram: 68% had a nonvisualizing gallbladder, some even after a double dose; stones were observed in 20%; in 12% diagnosis was established without benefit of X-ray. Among the function tests, only serum alkaline phosphatase was useful, being elevated in 74% of those with common duct stones. At operation, 61% claimed this was the first acute attack; 29% claimed a previous attack; 10% claimed 2 or more previous episodes. The av. time that the patients were aware of diseased gallbladder was, for acute cholecystitis, 4.8 yr.; chronic cholecystitis, 5.9; choledocholithiasis, 6.9. The number of patients and percentage mortality and morbidity in the various operative procedures, resp., were: cholecystectomy, acute (198, 3%, 15%), chronic (680, 0.7, 7.0), total (878, 1.2, 9.4); cholecystostomy, acute (18, 11, 22), chronic (38, 2.6, 18), total (56, 5, 19); cholecystectomy and choledochostomy, acute (29, 10, 31), chronic (286, 1.7, 14), total (315, 2.5, 13); choledochostomy, (25, 1.4, 0); total procedures (1274, 1.8, 11). Number of deaths and complications due to cardiovascular-pulmonary causes were 11 and 57, resp.; related to surgery or biliary tract disease, 12 and 86, resp. Final diagnosis with number of patients and percentage mortality, resp., was: acute cholecystitis (227, 3.9%); chronic cholecystitis (878, 0.9); acute cholecystitis with choledocholithiasis (18, 11); chronic cholecystitis with choledocholithiasis (126, 2.3); choledocholithiasis (19, 5); carcinoma of the common duct (2, 0); normal common duct (4, 0); total cases with acute inflammatory disease (245, 4.5); total cases with chronic inflammatory disease (1,029, 1.1). Nonfatal postoperative complications were: atelectasis and pneumonia (27); pulmonary embolus (4); thrombophlebitis (9); cystitis (11); pyelonephritis (3); myocardial infarction (9); cerebrovascular accident (5); gastrointestinal bleeding (2); wound infection (21); bile peritonitis (8); subphrenic or subhepatic abscess (5); pancreatitis (13); cholangitis (4); septicemia (2); ventral hernia (3); intestinal obstruction (3); persistent ileus (6); congestive failure (3); biliary fistula (5); total (143). Because of the progressive nature of cholecystitis, surgery is recommended immediately in those with inflammatory and calculous disease of the biliary tract.

8637 EXPERIMENTAL CHOLELITHIASIS AND LIVER LIPIDS IN RABBITS. INFLUENCE OF ETHANOL. (E.) Borgman, R. F. (Clemson U., S. C.) and F. H. Haselden. *Arch. Path. (Chicago)* 83(5):411-414, 1967.

Groups of New Zealand rabbits consisting of 5 males and 5 females each were formed by dividing litters between groups. Group 1 was fed a commercial rabbit ration (sterol ester fraction of liver ether extracts after 12 wk. on this diet was 80.3% of lipid fraction, triglyceride, 8.2%, free fatty acid, 3.8% and phospholipid fraction, 5.1%);

Group 2 received a purified ration containing 15% olive oil as the total fat source (sterol ester fraction of liver ether extracts after 12 wk. on this diet was 79.7% of lipid fraction, triglyceride, 12.7%, free fatty acid, 2.5% and phospholipid, 5.3%); and Group 3 received the same purified ration (sterol ester fraction of liver ether extracts after 12 wk. on this diet, 74.5%, triglyceride, 12.4%, free fatty acid, 5.3% and phospholipid, 5.5%) plus 15% ethanol in the drinking water. Animals received these rations for a 12-wk. trial period. Animals of Group 1 had normal livers, while those of Groups 2 and 3 had fatty degeneration, although those of Group 3 had less degeneration than those in Group 2. Liver lipid fractions were only modestly influenced by the treatments. The triglyceride percentages of the purified ration groups were greater than that of the commercial ration group, i.e., 12.4-12.7 compared with 8.2%. In Group 3, the sterol ester fraction was slightly less and the free sterol fraction greater than in the other groups. The fatty acid percentages of the liver lipid fraction varied both by fraction and by diet, as indicated earlier in brackets, but ethanol had only a minor effect. Rabbits in Groups 2 and 3 developed gallstones of the cholesterol type, but the ethanol had no definite influence on their formation. Rabbits fed a gallstone-producing diet (Groups 2 and 3) had lower 18:2 percentages in the liver sterol ester fraction than rabbits fed a commercial ration.

8638 SURGICAL MANAGEMENT OF SOLITARY ADENOMYOMA OF THE GALLBLADDER. (E.) Tompkins, R. K. (Ohio State U. Sch. Med., Columbus). Amer. Surg. 33(5):415-418, 1967.

Of 7 cases of adenomyoma of the gallbladder diagnosed over 18 yr., 5 were treated surgically; 3 of these were correctly diagnosed preoperatively; 3 had symptoms referable to the biliary system. Two who refused surgery have been followed for 6 and 13 yr. resp., and continue to have epigastric distress. In the patient followed longer, repeated cholecystograms failed to show a change in the gallbladder lesion. Opinion is divided in the literature as to whether cholecystectomy should be performed for asymptomatic adenomyomata. Decision to delay cholecystectomy should be based upon certainty of diagnosis by X-ray and absence of symptoms. It is considered that filling defects of the wall of the gallbladder should be treated by cholecystectomy if only to establish the diagnosis and to prevent possible future symptoms. The rate of malignant degeneration in an adenomyoma does not appear to be higher than that seen in normal gallbladder mucosa.

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NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology had accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus. For journals not covered by Index Medicus, the abbreviations (with some modifications) found in World Medical Periodicals, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Gr.	Greek	Pol.	Polish
Ar.	Arabic	Heb.	Hebrew	Por.	Portuguese
Bul.	Bulgarian	Hun.	Hungarian	Rum.	Rumanian
Ch.	Chinese	Ic.	Icelandic	Rus.	Russian
Cz.	Czech	In.	Indonesian	Ser.	Serbo-Croatian
Dan.	Danish	It.	Italian	Sl.	Slovene
Dut.	Dutch	Jap.	Japanese	Sp.	Spanish
E.	English	Kor.	Korean	Sw.	Swedish
Eston.	Estonian	Latv.	Latvian	Th.	Thai
Fin.	Finnish	Lith.	Lithuanian	Turk.	Turkish
Fr.	French	Maced.	Macedonian	Uk.	Ukrainian
Ger.	German	Nor.	Norwegian	Viet	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	µM	micromolar
admin.	administered, administration	max.	maximum, maximal
ADP	adenosine diphosphate	mc,µc	milli-, microcurie(s)
ATP	adenosine triphosphate	mg	milligram(s)
approx.	approximately	min.	minute(s)
av.	average(d)	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
°C	degrees centigrade	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
CNS	central nervous system	ng	nanogram (10-9)
conc.	concentrate(d), concentration(s)	pg	picogram (10-12)
		p.o.	orally
cpm	counts per minute	ppm	parts per million
DNA	deoxyribonucleic acid	r	Roentgen
e.g.	for example	RBC	red blood cells (erythrocytes)
g	gram(s)	resp.	respectively
µg	microgram(s)	Rev.	review (only in cite)
hr.	hour(s)	RNA	ribonucleic acid
i.m.	intramuscular	s.c.	subcutaneous
inj.	injected, injection(s)	sec.	second(s)
i.p.	intraperitoneal	SGOT	serum glutamic-oxalacetic tran
I.U.	international unit(s)	SGPT	serum glutamic-pyruvic transam
i.v.	intravenous	soln.	solution(s)
kg	kilogram(s)	U	unit(s)
LD50	median lethal dose(s)	UV	ultraviolet
LDH	lactic acid dehydrogenase	vol.	volume
m	meter(s)	WBC	white blood cells (leukocytes) count
M	molar		
mEq	milliequivalent(s)	wk.	week(s)
mM	millimolar	wt.	weight(s)

yr. years

GENERAL

9 STUDIES ON KALIKREINS. I. THE EFFECTS
OF GASTROINTESTINAL SYSTEM AND THE
ER ON PANCREATIC KALLIKREIN. (E.) Moriya, H.
. U. Tokyo), C. Moriwaki, S. Akimoto and
Yamazaki. Chem. Pharm. Bull. (Tokyo) 15(4):
-402, 1967.

likrein, extracted from the hog pancreas
-80 Frey U/mg) was examined for esterase and
omotor activities. It was tested in pooled
an gastric juice, in pooled human intestinal
ce, with rat liver slices, and was properly
fered at 37 ℃ for esterase activity. The
erase activity normally present in human
estinal juice was measured without the
ition of kallikrein as a proper control. For
n test, hog pancreatic extract from 0.5-1.5
was used. The vasomotor activity was measured
dog assay of the hog pancreatic extract
ectly, of the extract incubated with human
tric juice and human intestinal juice. The
odilator action of kallikrein was measured in
incubated liver slice medium. As the
erase activity of kallikrein extract decreased
the presence of various conc. of gastric juice
ing a 120-min. period, the vasodilator
ivity of the preparation also decreased.
re kallikrein was present in intestinal juice,
esterase activity of the kallikrein prepara-
n remained almost constant, as did the
odilator activity. No change occurred in
her property of the extract when incubated
h liver slices. The 2 properties, those of
esterase and a vasodilator, seemed to vary in
ctly the same degree and same direction in
se preparations and were of parallel strength
different extracts; thus these properties
ht be common to the same molecule. However,
re might be adsorption of one substance upon
ther, each having a different property. Two
ferent molecules might also be involved, each
h a different activity but with similar
sical characteristics and thus being extracted
ether.

0 PROPERTIES OF A NEW SYSTEM OF AMINE-
STORING CELLS IN THE GASTRIC MUCOSA OF
RAT. (E.) Håkanson, R. (U. Lund, Sweden),
Lilja and C. Owman. Europ. J. Pharmacol.
):188-199, 1967.

arge system of cells, structurally similar to
enterochromaffin cells of the stomach wall,
detected in the epithelium of the entire
ndular portion of the rat stomach after i.p.
in. of the amino acid precursor, L-3,4-di-
lroxyphenylalanine (L-DOPA, 100 mg/kg). This
tem of enterochromaffin-like cells normally
ores neither catecholamines nor serotonin but
take up L-DOPA by an active mechanism which
blocked by pretreatment with i.p. admin. of
mg/kg of cocaine. Previous inhibition of the
carboxylating enzyme with either 200 mg/kg of
(DL-seryl)-N-2,3,4-trihydroxybenzyl-hydrazine,
200 mg/kg of 4-bromo-3-hydroxybenzyloxyamine or 100 mg/kg of *m*-hydroxybenzylhydrazine diminished the fluorescence, indicating that L-DOPA is not retained in the cytoplasm unless it has been decarboxylated to dopamine. The intensity was increased after pretreatment with either 200 mg/kg of Pargyline (N-methyl-N-(2-propynyl) benzylamine) or 100 mg/kg of nialamide. In addition, these reserpine-resistant cells were triangular or flask-shaped, and were located between the columnar epithelial cells with their necks projecting towards the lumina of the gastric glands. The green fluorescence was diffusely distributed in the cytoplasm and conc. in the basal part of the gland.

8691 THE EFFECT OF HYPOPHYSECTOMY IN THE WEANLING RAT ON SIZE OF THE SUBMANDIBULAR GLAND AND ON SALIVARY PROTEINS. (E.) Carbone, D. F. (Harvard Sch. Dent. Med., Boston, Mass.), E. A. Sweeney and J. H. Shaw. Arch. Oral Biol. 12(6):721-731, 1967.

White rats (21 days old) were divided into 22 control and 28 experimental animals. The experimental rats were hypophysectomized by the parapharyngeal approach, weighed 3 times/wk. and their food consumption measured daily. At 80 days of age saliva was collected by a standard procedure after s.c. inj. of pilocarpine HCl (7.5 mg/kg) and total salivary protein conc. was determined for all animals. Serum was also obtained from each rat. Salivary and serum proteins were separated by paper electrophoresis. The animals were killed; the submaxillary and sublingual glands, thyroid, adrenal gland, testes and ovaries were excised and weighed. Hypophysectomy in the weanling rat resulted in major reductions in the growth rate, food consumption and relative wt. of endocrine target organs as compared to intact rats. The ratios of the wt. of the submandibular gland complex to body wt. were similar for hypophysectomized and normal rats; the size of the submandibular and sublingual glands was not uniquely dependent upon the pituitary gland hormones. Pilocarpine-stimulated salivary secretion and the total salivary protein were closely related to body wt. and to submandibular gland wt. in normal and hypophysectomized rats. Salivary protein conc. tended to be elevated in hypophysectomized rats. Altered conc. of protein components of saliva were noted in the experimental animals with marked increases of the anodal migrators.

8692 INFERIOR VENA CAVAL OBSTRUCTION FROM INCREASED INTRA-ABDOMINAL PRESSURE. EXPERIMENTAL HEMODYNAMIC AND ANGIOGRAPHIC OBSERVATIONS. (E.) Rubinson, R. M. (Nat. Heart Inst., NIH, Bethesda, Md.), J. S. Vasko, J. L. Doppman and A. G. Morrow. Arch. Surg. (Chicago) 94(6):766-770, 1967.

In 12 anesthetized normal dogs, pressures were recorded from catheters placed in the inferior vena cava immediately above and below the diaphragm and in the peritoneal cavity; intra-abdominal vol. was then acutely increased by serial inj. of glycerine-saline or air into the peritoneal cavity. After inj. of 100-150 ml/kg of fluid or air, there was a pressure gradient of 2-5 mm Hg between the 2 segments of the inferior vena cava; after the intra-abdominal vol. had been increased to 200-220 ml/kg, the av. pressure gradient was 28 mm Hg. Contrast radiographs showed progressive narrowing and angulation of the inferior vena cava at the diaphragm. In 3 dogs thoracic inferior vena caval flow was also measured, and varied inversely with the magnitude of the pressure gradient. Pressure and flow rapidly returned to control levels when the i.p. fluid was removed; intra-abdominal pressure fell. Acute abdominal distention of sufficient severity to elevate the intra-abdominal pressure, seems to result in obstruction of the inferior vena cava at the diaphragm. This functional and reversible form of inferior vena caval obstruction has occurred in patients, and its possible clinical importance is discussed.

8693 ACTION OF CARBAMYLCHOLINE ON THE STRIATED DUCTS GLYCOGEN IN MAMMALIAN SALIVARY GLANDS. (E.) Fava-De-Moraes, F. (U. Sao Paulo, Brazil), R. Giuffrida and L. C. U. Junqueira. Acta Histochem. (Jena) 27(1):1-8, 1967.

8694 TESTOSTERONE INDUCTION OF ESTEROPROTEOLYTIC ACTIVITY IN THE MOUSE SUBMAXILLARY GLAND. (E.) Angeletti, R. A. (Washington U., St. Louis, Mo.), P. U. Angeletti and P. Calissano. Biochim. Biophys. Acta 139(2): 372-381, 1967.

8695 FRACTIONATING OF SALIVARY GLYCOPROTEINS. (Fr.) Havez, R. (Fac. Med., Lille, France), A. Carlier-Vanneuville, C. Carlier and Y. Moschetto. C. R. Soc. Biol. (Paris) 161(2): 325-330, 1967.

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8699 EFFECT OF X-RAY IRRADIATION ON THE INTENSITY OF RADIOACTIVE METHIONINE INCORPORATION IN GASTRIC MUCOSA PROTEINS. (Uk. Sukhomlinov, B. F. (Lenin State U., Lvov, USSR) and Ia. P. Chaika. Ukr. Biochim. Zh. 38(5): 532-538, 1966.

8700 MORPHOLOGICAL CHANGES IN THE MUCOSA O
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8703 STUDIES ON CONSCIOUS DOGS IN THE INTRODUCTION OF SODIUM BALANCE. II. POSTPRANDIAL ELECTROLYTE AND WATER BALANCE WITH
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D. W. (U. Munich, Germany) and H. W. Reinhardt. Pflueger Arch. Ges. Physiol. 295(3):280-292, 1967.

8704 INTESTINAL FLORA OF HEALTHY PERSONS UNDER THE INFLUENCE OF ETHACRIDIN LACTATE. (Ger.) Knothe, H. (Goethe U., Frank
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ATROPINIZED EXOCRINE PANCREAS IN THE MOUSE. (Ger.) Stöcker, E. (U. Wurzburg, Germany), H. W. Altmann and P. Bödefeld. Naturwissenschaften 54(14):371, 1967.

8707 SYNTHESIS OF Δ^{7}-COPROSTENOL AND ITS IDENTITY WITH THE STEROL FORMED BY THE REDUCTION OF 7-DEHYDROCHOLESTEROL BY INTES
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See also abstract no.: 8812

VASCULARIZATION OF THE HEPATIC AND
COMMON BILE DUCT. (ANATOMIC AND
AL PROBLEMS OF COMMON BILE DUCT PATHOLOGY).
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ili and L. Baldelli. Riv. Gastroent.
185-200, 1966.

ood supply of the common bile duct was
d by an angioplastic technic using plastic
in 15 anatomical specimens obtained at
y. Frequent controls were undertaken to
that no macroscopic evidence of biliary
or hepatic artery pathology was present.
as taken that the peri-biliary area re-
intact and that its normal connections
he liver, stomach, duodenum, hepatic
(origin), and hepatoduodenal ligament
reserved. Findings were not always con-
t in all specimens. The supra-duodenal
n of the common bile duct received its
supply from the supraduodenal artery,
frequently arose from the retroduodenal
. The supraduodenal artery gave off an
ing branch (Wilkie's artery) which in turn
few slender branches to the anterior sur-
f the cystic and common bile ducts. In
ases, the posterior surface of the common
uct received 2 ascending branches, 1 from
praduodenal and 1 from the gastroduodenal
. On the other hand, great consistency
ted in the blood supply of the intra-
atic portion of the common bile duct by
of the retroduodenal artery, which also
ranches to part of the supraduodenal por-
The retroduodenal artery consisted of an
nt vascular network and was much larger
he supraduodenal artery. A much more
us blood supply was observed in the intra-
atic portion than in the supraduodenal por-
f the common bile duct. The most highly
arized surfaces were the right lateral and
ior. The supraduodenal portion of the
bile duct is probably most suitable for
ochotomy, especially the anterior surface
the point of entry of the cystic duct.

INTRAORGAN INNERVATION OF THE LIVER.
(Rus.) Azarova, A. M. (Kharkov Med.
USSR). Arkh. Anat. 52(2):72-77, 1967.

rgan liver nerves were studied by the
microscopic method of V. P. Borob'ev in 6
preparations obtained from subjects who
ed from various diseases. Intraorgan
c innervation was accomplished by way of
ior and posterior hepatic plexuses, branches
e vagus nerve from the gastric plexus and
branches which accompany the inferior
cava. The distribution of nerves which
pany the hepatic artery and the vena porta
the liver follows the segmental distribution
ese vascular tributaries. The vascular-
l nodules of the portal tract cross at
angles with the branches of the hepatic
veins; in the region of such crossings, a close contact occurred between the vascular-neural nodules of both the portal tract and the hepatic veins. Both venous systems repeatedly crossed each other in the depth of the liver. With these venous systems there were large accumulations of connective tissue; the larger portion belonging to the portal tract nodule, and the smaller portion to the hepatic vein. Such crossings of branches of the 2 venous systems in the left hepatic lobe were found constantly and almost regularly in one and the same parts. In the right lobe, the crossings were noted only in the peripheral portions of the liver. No combination of the nerves of the portal tract nodules and nerves in the wall of the hepatic veins was observed.

8710 ENDOPLASMIC RETICULUM AND THE ORIGIN OF MICROBODIES IN FETAL MOUSE LIVER. (E.) Essner, E. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.). Lab. Invest. 17(1):71-87, 1967.

The form and distribution of bile canaliculi, Golgi apparatus and lysosomes in 18-day fetal mouse (C3H/MIL; C3H/An inbred strains) liver were studied in frozen sections intubated for phosphatase activities that delineate these organelles. Two interrelated changes in fine structure of the parenchymatous cells were described; 1) extensive dilatation of terminal regions of the rough endoplasmic reticulum and accumulation of amorphous material, presumably secretory, within them; and 2) increase in the number of microbodies occurring in close association with the dilatations of reticulum. Orientation of the endoplasmic reticulum toward the Golgi apparatus suggested the possibility of movement of secretory material from the dilatations of endoplasmic reticulum to the Golgi apparatus. Spatial association, structural similarities and direct continuities between microbody membrane and endoplasmic reticulum suggested that the microbodies arose from dilatations of the reticulum. On the basis of these findings a sequence is proposed for the formation of microbodies from dilations of the endoplasmic reticulum in the parenchymatous cells of the fetal liver.

8711 STRUCTURE AND SIZE OF CANINE COMMON BILE DUCT. (E.) Mahour, G. H. (Mayo Clin., Rochester, Minn.), K. G. Wakim, E. H. Soule and D. O. Ferris. Arch. Surg. (Chicago) 95(2): 241-244, 1967.

8712 INTRAORGAN LYMPHATIC SYSTEM OF STOMACH IN SOME SPECIES OF AMPHIBIA AND REPTILES. (Rus.) Balashev, V. N. (Leningrad Med. Inst., Sanit.-Hygiene, USSR). Arkh. Anat. 52(6): 57-64, 1967.

See also abstract nos.: 9413,9487

8713 ETIOLOGY OF ANEMIA IN THE JAPANESE. II. INFLUENCES OF DIETARY PROTEIN ON IRON ABSORPTION. (Jap.) Miyata, S. (Toho U., Tokyo). Nippon Ketsueki Gakkai Zasshi (Acta Haemat. Jap.) 29(6):845-849, 1966.

Rats were divided into 2 groups: Group 1 received ordinary solid food containing animal protein; Group 2 received a special diet containing defatted soy bean protein instead of animal protein. The protein content of both foodstuffs was equivalent. The rat small intestine was ligated by the Laszt method, and a vol. (amount unspecified) of $FeCl_3$ mixed with $^{59}FeCl_3$ as a tracer was infused into the ligated intestine; 90 min. later, Fe absorption was studied by measuring the Fe content of intestinal contents and of the intestinal wall. No difference in Fe absorption was found between the 2 groups when animals were fed for only 1 or 2 days; however, after 7, 14 and 21 days, there was a marked decrease in Fe absorption in animals which received no animal protein. It is concluded that the quality of protein in the daily diet influences the absorption of Fe.

8714 STUDIES ON INTESTINAL ABSORPTION OF HYDROXYCOBALAMINE II. BIOLOGICAL HALF LIFE OF HYDROXYCOBALAMINE IN SMALL INTESTINAL WALL. (Jap.) Abe, T. (Tokyo Med. Dent. U.), T. Nakajima and H. Okamura. Nippon Ketsueki Gakkai Zasshi (Acta Haemat. Jap.) 29(6):874-878, 1966.

Hydroxycobalamine, admin. i.m., is absorbed slowly from the site of inj. compared with cyanocobalamine. The biological half-life of these substances was studied in the small intestine of rabbits. They received 0.1 μg/kg p.o. of either ^{57}Co-hydroxycobalamine or ^{57}Co-cyanocobalamine, and were sacrificed at 1, 6, 12, 18 and 24 hr. after admin. in order to estimate the uptake of ^{57}Co in the proximal, middle and distal portions of the small intestinal wall. The distal third of the small intestine had the highest activity at each time interval after admin. of either agent. The biological half-lives of hydroxycobalamine and cyanocobalamine in the whole small intestinal wall were 50 and 9 hr., resp., while those of the distal third of the wall were 11 and 6 hr., resp. It is concluded that hydroxycobalamine has a longer biological half-life in the small intestinal wall than cyanocobalamine.

8715 CLINICAL STUDIES ON IRON ABSORPTION. REPORT I. FERROUS SULFATE ABSORPTION TEST. (Jap.) Yamaba, M. (Kyoto U., Japan). Naika Hokan (Jap. Arch. Intern. Med.) 13(11): 495-505, 1966.

An aqueous soln. of 5 mg ferrous sulfate (1 mg as Fe) combined with 5-10 μc of $^{59}FeCl_3$ and 100 mg of ascorbic acid was admin. p.o. to fasting subjects early in the morning, and the Fe absorption rate was determined in feces and RBC. With regard to measurement, the amount of ^{59}Fe excretion in feces was determined within a range of error of approx. 3% by repeated measurement on an accurately weighed, thoroughly mixed sample of feces; the amount of ^{59}Fe uptake by RBC could similarly be determined within a range of error of approx.
by repeated measurement on a 2-ml blood sampl
The daily activity of ^{59}Fe excreted in feces
p.o. admin. was less than 1% of the admin. am
within 10 days; thus it is considered adequat
collect fecal specimens 10 days after p.o. ad
In 8 normal subjects, the av. rate of Fe abso
tion, calculated by the feces method, was
30.8 ± 3.0%, and by the RBC method, 17.5 ± 6.
In order to study the difference between the
absorption rate obtained by the feces method
that obtained by the RBC method, the distribu
of ^{59}Fe in the body was studied in normal rat
after admin. of radioactive ferrous sulfate l
with ^{59}Fe. Approx. 10% of the ^{59}Fe taken up
the RBC was distributed in the liver, small i
testines, etc. A significant correlation was
between Fe absorption rates obtained by the f
method and by the RBC method. Compared with
subjects, 10 cases of Fe deficiency anemia ha
greater Fe absorption rates, i.e., 53.1 ± 22.
by the feces method and 45.5 ± 20.1% by the F
method. The rate of Fe absorption significar
correlated with the serum Fe conc. and with t
hemoglobin value, but not with the degree of
acidity in the gastric juice. The Fe absorpt
rate was almost normal in patients with post-
gastrectomy anemia and with Banti's syndrome,
and was slightly low in patients with chronic
hepatitis. The Fe absorption rate of patient
with asplastic anemia was nearly normal by th
feces method.

8716 CLINICAL STUDIES ON IRON ABSORPTIOI
REPORT II. EGG IRON ABSORPTION TES
(Jap.) Yamaba, M. (Kyoto U., Japan). Naika
Hokan (Jap. Arch. Intern. Med.) 13(12):519-5
1966.

The rate of Fe absorption was determined by
both the feces and RBC methods after p.o. adm
of 55 g of egg (used as a model food) labelec
with ^{59}Fe (1.27 mg as Fe) in fasting subjects
and the findings were compared with values pr
viously obtained of the rate of ferrous sulfa
absorption. As determined in 9 normal subjec
the rate of Fe absorption was 16.1 ± 5.66% by
the feces method and 4.9 ± 1.4% by the RBC me
The rate of Fe absorption in 15 patients with
Fe-deficiency anemia was 20.6 ± 10.3% by the
feces method and 12.8 ± 10.5% by the RBC meth
These rates of egg Fe absorption had a signif
correlation with the degree of acidity of gas
juice, but not with the hemoglobin value or t
amount of Fe in the serum. When patients wer
subdivided according to the degree of acidity
of the gastric juice (anacidity-hypoacidity,
normoacidity-hyperacidity), the rate of Fe ab
sorption was almost normal in the first group
and was high, with a statistically significar
difference from normal values, in the second
group. The Fe absorption rate in patients wi
postgastrectomy anemia was low, with a statis
ally significant difference from normal value
and the Fe absorption rate of patients with B
syndrome, chronic hepatitis and aplastic anem
was almost the same as normal values. The fe

ate absorption test and the egg Fe absorption were performed in the same patients in order otain a comparative study of both Fe absorp- rates. In normal subjects, the absorption of egg Fe (RBC) was less than half that of ous sulfate absorption. In patients with eficiency anemia, absorption of egg Fe was , almost to the same degree as in normal ects. Those patients with hypo- or anacidity cially had markedly low values in the rate of Fe absorption. In patients with postgastrectomy ia, absorption of egg Fe was extremely poor pite of good absorption of the Fe salt. In ents with Banti's syndrome, chronic hepatitis aplastic anemia, absorption of egg Fe was , almost to the same degree as in normal ects.

CLINICAL STUDIES ON IRON ABSORPTION.
REPORT III. INVESTIGATION ON VARIOUS
ORS INFLUENCING IRON ABSORPTION. (Jap.)
oa, M. (Kyoto U., Japan). Naika Hokan
. Arch. Intern. Med.) 13(12):529-538, 1966.

absorption tests using ferrous orotate (1 mg e) and ferrous fumarate (1 mg as Fe), both led with radioactive ^{59}Fe, were both performed atients and normal subjects in order to com- the rate of absorption of these organic Fe lexes with that of ferrous sulfate. Another on for these comparisons was that changes in osorption were observed with the addition of rbic acid, with admin. of ferrous fumarate, with reduced glutathione. The state of dis- tion of ferrous orotate and of ferrous rate in gastric juice was studied, indicating the degree of acidity of the gastric juice an important role in isolation of Fe from e compounds. In normal subjects, the rate osorption of these organic Fe complexes was st the same as that of ferrous sulfate. Pa- ts with Fe-deficiency anemia had good ab- tion rates of both of the organic Fe com- es, comparable to rates in normal subjects, showed almost the same values as with ferrous ate. The rates of Fe absorption thus obtained significantly correlated with the degree of ity of the gastric juice. In 2 patients with gastrectomy anemia, these Fe-absorption rates slightly less compared to the rate of ferrous ate absorption. The absorption rates of Fe and without addition of ascorbic acid were ared using ferrous fumarate labeled with ^{55}Fe ^{59}Fe (a daily dose of 150 mg as Fe); the ad- on of ascorbic acid promoted the absorption e. The rate of Fe absorption increased arly as the daily dose of ascorbic acid was eased to 600 mg, 1200 mg and 1800 mg. When ous sulfate was admin., with or without 100 mg lutathione (reduced), the rate of Fe absorp- was increased in the combination which ained glutathione.

STUDIES ON KALLIKREINS. II. PASSAGE
OF ^{131}I-LABELLED HOG PANCREATIC
KALLIKREIN ACROSS THE RAT INTESTINE. (E.)
Moriya, H. (Sci. U. Tokyo), C. Moriwaki and
S. Akimoto. Chem. Pharm. Bull. (Tokyo) 15(4):
403-410, 1967.

Hog pancreatic kallikrein (molecular wt. approx. 33,000) labeled with ^{131}I (66.7 Frey U/mg) was used. A 10-cm jejunal loop was tied off in fasting rats (120 g); 0.2 ml of saline containing 3 mg of ^{131}I-labeled kallikrein (9.6 x 10^6 cpm) was inj. into the loop; 2-3 hr. later the animals were killed by bleeding and the liver, kidney, spleen, thyroid, small intestine and serum were tested for radioactivity in a well-type scintillation counter. Some serum was dialyzed to ascertain if the radioactivity was dialyzable; serum protein was precipitated, the precipitate washed, and its radioactivity measured. Radiopaper chromatographic analysis was also performed to determine purity of the ^{131}I-kallikrein. In vitro experiments on intestinal transfer of ^{131}I-kallikrein were done on everted 10-cm segments of jejunum tied off at the ends, containing 1 ml of Krebs-Ringer soln., placed in 30 ml of the same soln. containing ^{131}I-kallikrein, oxygenated, and maintained at 37°C. After 1 hr. the serosal fluid was removed and radioassayed. Dialysis against water, and radiopaper chromatography were done and the vasodilator activity was determined in the dog. Controls were maintained using KI-K^{131}I. About 54% of the radioactivity remained in the intestinal loops inj. with ^{131}I-kallikrein in vitro whereas those inj. with KI-K^{131}I had little radioactivity remaining in the loop. Of the absorbed radioactivity, most was in the serum after 2 hr. Of the organs, the liver had most, the kidney about half that of the liver, the spleen and thyroid about one-fifteenth that of the liver. About 1.7% of the original radioactivity was in the liver. When ^{131}I-kallikrein was inj. i.v. the liver also had the greatest uptake among the organs examined. In vitro, about 40% of the radioactivity was transferred to the serosal side in 1 hr. No difference in the vasodilator activity of the ^{131}I-kallikrein occurred before or after passage through the intestinal wall, and no difference occurred before and after dialysis of these fractions.

8719 EXPERIMENTAL STUDIES ON ABSORPTION
MECHANISM OF BILE ACIDS THROUGH DOG
GALLBLADDER WALL. (Jap.) Yoshimura, N. (Kyushu
U., Fukuoka, Japan). Igaku Kenkyu (Acta Med.
[Fukuoka]) 36(2):156-171, 1966.

In vitro studies were done in a diffusion apparatus consisting of 2 cylindrical, ported, glass chambers 10 mm in inside diameter and 50 mm long, closed at one end and flanged at the other so that the dog gallbladder mucosa could be clamped between the flanged ends, allowing diffusion through the mucosa from one chamber to the other. In vivo studies were done by perfusing the gallbladder through a specially constructed 2-lumen cannula permitting even perfusion with constant recirculation of the perfusate by a pump. A sampling valve was provided for removal of fluid for analysis. Analysis of bile acids was made by photometry and thin-layer chromatography. Chromatography was also used for determination of other constituents in bile. The soln. pH was constantly checked by potentiometer and the following measurements made: Apparent partition coefficients of bile acids to isoamyl acetate by the equilibrium method, and binding ratios of cholic acid to lecithin and polyoxyethylene sorbitan monooleate were obtained by sack dialysis at several different pH values; The amounts of cholic acid transported through stripped canine gallbladder mucosa were determined in vitro using the diffusion apparatus. The dog gallbladders were perfused in vivo with the bile acid soln. and the absorption rates of the bile acids through the gallbladder mucosa were determined at different pH values. This was done in 51 dogs. Cholic and taurocholic acids were absorbed at rapid rates at pH values lower than the pKa of the bile acids; (pKa was obtained from the Henderson-Hasselbach formula). At pH values higher than pKa, bile acids were poorly absorbed. These results indicate that the passage of bile acids through the gallbladder mucosa occurs as the non-ionized form passing through a lipid barrier. Transport of unconjugated cholic acid was passive; the conjugated bile acid, taurocholic acid was not always passively transported. Cholic and taurocholic acid mixed with surface-active substances such as lecithin and polysorbate-80 were not absorbed through the gallbladder wall even in acidic soln. Apparently large, impermeable micellar complexes are formed. These studies were statistically significant.

8720 ABSORPTION OF GLUCOSE FROM THE COLON AND RECTUM. (E.) Long, C. L. (Columbia U., New York City), J. W. Geiger and J. M. Kinney. Metabolism 16(5):413-418, 1967.

Experiments on colonic and rectal absorption of glucose were carried out in 4 female and 2 male subjects. All the females had colostomies, 3 in the transverse colon and one in the right colon; 1 male had colostomy of the transverse colon, the other male had undergone an operation for hernia and was the subject for the rectal absorption study. ^{14}C-Glucose, uniformly labeled (specific activity 48.65 µc/mM) was dissolved in saline, 20 µc/3.5 ml; and the activity determined in a liquid scintillation counter. The ^{14}C-glucose was admin. by colostomy or rectal tube and was followed by 10-20 ml saline soln. to wash all radioactivity from the tube into the bowel. Single ^{14}C-glucose inj. were made the day after the colonic or rectal absorption study. Neomycin was used to sterilize the gastrointestinal tract of 1 subject; total dosage was 4 g over 48 hr. prior to 1 phase of the absorption study. Expired CO^2_2, O_2 and $^{14}CO_2$ were continuously measured for 3 hr. after a 30-min. base period of measurement of CO_2 prior to ^{14}C-glucose admin. Gas analyses were also made at 3 and 7 hr. after admin. of radioactive glucose. Blood samples were taken each hr. for 5 hr. after isotope admin., and specific activity of glucose was determined in these samples. The percentage of the dose expi as $^{14}CO_2$ was between 14 and 25 in 3 hr. whether ^{14}C-glucose was given by colostomy or rectal tube. ^{14}C-Glucose inj. i.v. produced 17-25% $^{14}CO_2$ in 3 hr. One patient in addition was gi ^{14}C-glucose by nasogastric tube and the amount radioactive CO_2 expired was the same. Very lo blood glucose specific activities were found i all patients when ^{14}C-glucose was given by colo tomy or rectal tube at any time during the stu (less than 0.01 µ/mM glucose). When ^{14}C-gluco was inj. i.v. the specific activity was as hig as 150 times this value in 30 min. and 15 time as high at the end of 3 hr. The rate of entry ^{14}C into the bloodstream from the colon or rec was too low to account for the $^{14}CO_2$ expired i 3 hr. After neomycin therapy the $^{14}CO_2$ was completely eliminated from the breath after ad of ^{14}C-glucose. Glucose is not absorbed as su across the colonic or rectal mucosa, but undergoes bacterial degradation before absorption.

8721 ENZYMIC HYDROLYSIS OF THE CARBON-FLUORINE BOND OF α-D- GLUCOSYL FLUOR BY RAT INTESTINAL MUCOSA. LOCALIZATION OF INTESTINAL MALTASE. (E.) Barnett, J. E. G. (U. Southampton, England), W. T. S. Jarvis and K. A. Munday. Biochem. J. 103(3):699-704, 196

Rat small intestine mucosa was extracted by homogenizing and centrifuging at 26,000 g unti the supernatant was clear. The supernatant wa the extract used in the tests of the enzymic hydrolysis of the carbon-fluorine bond. Many different technics were used: the glucose-oxi methods A and B, glucosyl fluoride hydrolase b release of F⁻, assay of α-D-glucosidase with o-nitrophenyl α-D-glucoside, the mutarotase test, and chromatography. The tissue accumula experiment with the measurement of reducing su and fluorine determination by the microdiffusi method were also used. Alpha-D-Glucosyl fluor was hydrolyzed by the rat intestinal mucosa ex tract. Optimum pH was 6.6 and Km was 0.4 mM a 20°; this hydrolase activity was associated wi both mutarotase and α-D-glucosidase activities Tris (5 mM) inhibited both α-D-glucosidase and α-D-glucosyl-fluoride-hydrolase activities by 55% but did not inhibit mutarotase. K_i of Tri for both enzyme activities was 2 mM. The extr did not hydrolyze melibiose and lactose. The thermal stability of α-D-glucosidase and the α-D-glucosyl fluoride hydrolase was identical while mutarotase was more thermolabile. A preparation of the brush border of intestinal epithelial cells contained both α-D-glucosyl-fluoride-hydrolase and α-D-glucosidase activit In each precipitate and washing the ratio of t 2 activities was the same; all the mutarotase activity was in the 1st supernatant. Agidex, fungal amylglucosidase, cleaved glucosyl fluor in addition to maltose. Tris inhibited both activities and in each case K_i was 3 m N. The probability of identity of α-D-glucosyl fluori

ase and α-D-glucosidase is very high. In-
on of intestinal slices with 1 mM α-D-gluco-
uoride led to complete hydrolysis in 30 min.
ucose rapidly entered the cell and was
lized, leaving the fluorine in the medium.
onstitutes a further proof that intestinal
ucosidase, although located on the brush
, is located outside the site of sugar
transport.

ACTIVE TRANSPORT OF L-SELENOMETHIONINE
IN THE INTESTINE. (E.) McConnell, K. P.
sp., Louisville, Ky.) and G. J. Cho. Amer.
siol. 213(1):150-156, 1967.

ive transport of L-^{75}Se-methionine across
testine of the hamster was found; the
ort rate varied from segment to segment.
e (5.5 mM) and galactose (5.5 mM) inhibited
ansport of L-^{75}Se-methionine by 22% and 24%,
Ouabain (10^{-6} M) reduced transport of
-methionine if present on the serosal side,
t on the mucosal side; this indicated that
ansport of L-^{75}Se-methionine is dependent
he Na pump. Phlorhizin (10^{-4} M) did not af-
he transport of L-^{75}Se-methionine but did
duce the inhibitory effect of hexoses. The
l-to-serosal flux of L-^{75}Se-methionine ap-
ly requires an aerobic pathway involving oxi-
phosphorylation, since 2,4-dinitrophenol
M) and KCN (10^{-3} M) reduced the transport of
-methionine by 75% and 67%, resp. DL-Seleno-
nine (10 mM) reduced the rate of active
ort of ^{14}C-DL-methionine (1 mM), the corres-
g S-analog by 78%; this suggests that seleno-
nine and methionine utilize the same trans-
ystem. The implication of the S-Se antagon-
relation to active transport and Se poison-
e discussed.

INTESTINAL IRON ABSORPTION BY NEONATES
AND SOME FACTORS AFFECTING IT. (E.)
l, E. (Radcliffe Infirm., Oxford, England).
. Clin. Med. 70(1):138-149, 1967.

orption was studied in suckling rats (inbred
rats, Wistar strain) which were normal,
ransfused with viable RBC or overloaded
e, since it is known that their stores be-
elatively deficient in Fe while receiving
lk which is rich in Fe. A whole-body
ng technic was used with ^{59}Fe-labeled fer-
alts, hemoglobin and rat milk. Almost all
0 µg dose of Fe^{++} was absorbed during the
2 wk. of life; after this, absorption
lly declined to approx. 25% at 30 days of
^{59}Fe-labeled rat milk was absorbed in a
r manner, while ^{59}Fe-labeled hemoglobin was
ed less efficiently at all stages. Suckling
tal) rats resembled adults in that factors
d to the intestinal lumen, such as size of
dose and prior admin. of a large blocking
f Fe, reduced Fe^{++} absorption. They dif-
from adult rats in that factors which in-
intermediary Fe metabolism, such as the
of circulating RBC or the level of Fe stores,
t affect Fe^{++} absorption. These results
related to the observation that during the
first 18 days of life the intestinal mucosa of the rat is able to absorb large molecules, such as protein antibody, by pinocytosis. Cortisone acetate, admin. s.c. to rats 8-10 days old, has been shown to mature the intestinal absorptive cells within 72 hr. so that pinocytosis no longer occurs. A group of 12 neonatal rats which had been treated with cortisone acetate (inj. i.m.; 0.06 mg/g) when 10-11 days old, absorbed a mean of 76.0 ± 8.22% of a test dose of Fe^{++} admin. 3 days later; this was significantly less than the mean percentage of Fe absorbed by their littermate controls (88.3 ± 3.64%).

8724 RE-EVALUATION OF RADIO-IODINATED TRIOLEIN AS A TEST FAT IN FAT ABSORPTION STUDIES. (E.) Sie, H. G. (U. Groningen, Netherlands), A. J. Valkema and F. J. Loomeijer. J. Lab. Clin. Med. 70(1):121-128, 1967.

The absorption of radio-iodinated triolein was compared to that of glyceryl-trioleate-^{14}C (which is physiologically identical with natural triolein) in rats (albino, Wistar strain). The latter were maintained on an unrestricted diet of ground commercial rat chow and 10% olive oil. There was no difference in the absorption of these 2 radioactive fats as determined by the radioactivity in the stool. The absorption of radio-iodinated triolein mixed with olive oil was 91.7 ± 7.6%, compared to 91.6 ± 9.8% for glyceryl-trioleate-^{14}C. In the stomach, small intestine, cecum and colon, and in stool, no deiodination of the radio-iodinated triolein was found. However, in the small intestinal wall and in the thoracic duct lymph, massive deiodination of the ^{131}I-labeled fat was present. These results suggest that deiodination of the radio-iodinated triolein occurs after it is absorbed in the gastrointestinal tract. Because of this it is concluded that radio-iodinated triolein can be used to substitute glyceryl-trioleate-^{14}C and natural triolein as a test fat in fat absorption studies in the rat if fecal radioactivity is taken as the index for fat absorption.

8725 METHIONINE TRANSFER ACROSS GOLDFISH INTESTINE ACCLIMATIZED TO DIFFERENT TEMPERATURES. (E.) Smith, M. W. (A. R. C. Inst. Animal Physiol., Cambridge, England). Experienta 23(7):548-549, 1967.

Goldfish were maintained in aerated water at 8°, 15°, 20°, 25° or 30°C for 2-3 wk.; after sacrifice, the anterior intestine was everted on a polythene-covered metal rod to form 2 sacs which were both filled with 100 µliter of bicarbonate-saline containing 5.5 mM glucose and 10 mM methionine. The everted sacs were suspended from open-ended cannulae in 15 ml of the same methionine-containing bicarbonate-saline gassed with a mixture of 95% O_2 and 5% CO_2. One sac was incubated at 30°C and the other at a temperature equal to the previous environmental temperature of the fish. Serosal transfer of methionine, measured at 30°C, fell as the acclimatization temperature was raised, showing that some regulation of methionine transport (transfer) occurred. When the incubation temperature was adjusted to be the same as the environmental temperature of the fish, the transfer of methionine rose with increasing temperature, showing that the regulatory mechanism did not compensate fully for the rise in environmental temperature. The ability of goldfish intestine to conc. methionine at its serosal surface when incubated at 30°C showed no dependence on the previous acclimatization temperature. Both fluid and methionine transfer were measured at 30°C using intestines taken from fish acclimatized to different temperatures; the transfer of fluid was reduced 5-fold and the methionine transfer 2-fold for a 22°C shift in the acclimatization temperature. Thus, the regulation of methionine transfer seemed to be concerned primarily with regulation of fluid (and therefore Na) transfer. When these results on methionine transfer were compared with previous estimations of methionine, free in the intestinal mucosa and in the extracted protein, it was found that all 3 levels increased by approx. the same proportion for the same shift in acclimatization temperature; this implied that the ability of the mucosal cell to conc. methionine determines its own incorporation into protein. It is postulated that in the goldfish intestinal mucosa, methionine may act in opposition to valine as a pacemaker for other processes involved in the metabolic regulation of cells exposed to different temperatures.

8726 ESTIMATION OF HUMAN CALCIUM ABSORPTION BY EXTERNAL RADIOISOTOPE COUNTING. (E.) Curtis, F. K. (VA Hosp., Seattle, Wash.), H. Fellows and C. Rich. J. Lab. Clin. Med. 69(6): 1036-1041, 1967.

A large vol. scintillation counter was used to measure fractional accumulation of ^{47}Ca in the human forearm after an i.v. and a later p.o. dose of radioisotope; the fractional absorption of p.o. Ca was calculated from this information and compared to the absorption determined from stool radioisotope recovery. In practice, the patient was given an i.v. dose of approx. 1 μc of ^{47}Ca in 1 ml of saline containing 0.1 mg of ^{40}Ca; 23 hr. after the i.v. inj., the count rate of the arm was measured, after which exactly 25 ml of the same soln. of ^{47}Ca, mixed with 200 mg of Ca as calcium gluconate and 75 ml water, was given p.o. The patient was fasted for at least 12 hr. before and 2 hr. after this p.o. dose. Coincident with the p.o. dose, the patient was given 500 mg of chromium sesquioxide in a gelatin capsule, and a stool collection started. The arm count was determined 25-50 hr. after the p.o. dose, and the stool collection continued for at least 5 days. In 16 studies on 14 patients (10 with no evident disorders of Ca metabolism or intestinal function, and 1 each with osteomalacia, steatorrhea, osteoporosis and hyperparathyroidism), there was good agreement between the 2 methods with a correlation coefficient of 0.94. It is concluded that external counting offers a convenient and precise method to determine fractional absorp of ^{47}Ca.

8727 A NEUTRAL SODIUM PUMP AND THE HEXOS TRANSFER POTENTIAL IN THE RAT SMALL INTESTINE. (E.) Barry, R. J. C. (U. Sheffie England), J. Eggenton and D. H. Smyth. J. Ph (London) 191(2):72P-73P, 1967.

8728 FAT ABSORPTION IN DIABETES MELLITUS (E.) Corsini, G. (U. Pisa, Italy), E. Gandolfi, I. Bonechi and B. Cerri. Diabet 16(7):455-461, 1967.

8729 ACID PHOSPHATASE ACTIVITY IN CYTOPL BODIES OF THE ABSORBING INTESTINAL FROM SUCKLING PIGS. (E.) Björkman, N. (Roy. Vet. Coll., Stockholm) and M. Sibalin. Exper 23(5):339-341, 1967.

8730 HISTOCHEMICAL STUDY OF INTESTINAL M IN CHILDREN. I. NORMAL DUODENO-JE MUCOSA. (Fr.) Jos, J. (Child. Dis. Hosp., Paris), J. Frézal, J. Rey and M. Lamy. Ann. Histochim. 12(2):155-164, 1967.

8731 INTESTINAL DISACCHARIDASES. PHYSIO PATHOLOGY AND CLINICAL SIGNIFICANCE (Por.)(Rev.) Areias, M. E. (Fac. Med., Lisbo and J. Pinto Correia. J. Med. (Porto) 63(127 549-557, 1967.

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8733 AMINO ACID ABSORPTION THROUGH INTES EPITHELIUM. (E.)(Rev.) Smyth, D. (U. Sheffield, England). Protoplasma 63(1-3) 26-29, 1967.

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8747 INTERPRETATION OF THE EFFECTS OF AMPHOTERICIN B ON THE PERMEABILITY OF THE SMALL INTESTINE AND COLON IN THE GREEK TURTLE. (It.) Lippe, C. (U. Milan, Italy) and B. Giordana. Boll. Soc. Ital. Biol. Sper. 43(8): 437-439, 1967.

8748 EXPERIMENTAL STUDY OF THE ABSORPTION AND ELIMINATION OF ASTIBAN LABELLED WITH ^{124}Sb. (E.) Fraga De Azevedo, J. (Inst. Trop. Med., Lisbon), F. Bragança Gil, F. Barreira, R. Martins Da Rocha and O. S. Monteiro. An. Inst. Med. Trop. (Lisboa) 23(1-2):3-10, 1966.

8749 ABSORPTION, DISTRIBUTION AND METABOLISM OF THE ANTHELMINTIC METHYRIDINE. (E.) Burns, J. (Imperial Chem. Ind. Ltd., Macclesfield, Cheshire, England), W. A. M. Duncan and B. Scales. Biochem. Pharmacol. 16(3):463-482, 1967.

8750 LINCOMYCIN: ACTIVITY IN VITRO AND ABSORPTION AND EXCRETION IN NORMAL YOUNG MEN. (E.) McCall, C. E. (Harvard Med. Sch., Boston, Mass.), N. H. Steigbigel and M. Finland. Amer. J. Med. Sci. 254(2):144-145, 1967.

8751 METHODS OF MEASUREMENT OF DIGESTIVE ABSORPTION OF IRON. (Fr.)(Rev.) Najean, Y. (St. Louis Hosp., Paris) and N. Ardaillou. Nouv. Rev. Franc. Hemat. 7(2):270-277, 1967.

8752 ABSORPTION OF IRON (FERROUS SULFATE) IN PATIENTS WITH CHRONIC RENAL DISEASE AND ANEMIA. (It.) Curti, B. (U. Turin, Italy), G. Bianco, G. Sardi, D. Marini, F. Greco and L. Chiandussi. Boll. Soc. Ital. Biol. Sper. 43(7):329-332, 1967.

8753 INTESTINAL IRON ABSORPTION IN MAN, METHODS OF MEASUREMENT AND NORMAL RANGES. A CRITICAL REVIEW. (Ger.)(Rev.) Heinrich, H. C. (U. Hamburg, Germany) and H. Bartels. Klin. Wschr. 45(11):553-558, 1967.

See also abstract no.: 9407

8754 THE ROLE OF ANTRUM-PYLORUS-DUODENUM SYSTEM IN THE EXCRETION OF GASTRIC JUICE IN RATS. (Hun.) Dobi, S. (U. Debrecen Sch. Med., Hungary), A. Györffy, G. Mózsik and T. Jávor. Kiserl. Orvostud. 18(6):579-581, 1966.

Ligature of the pylorus in rats leads to accumulation of gastric juice in the stomach and subsequently to development of Shay's ulcers. Whether the ligature of the pylorus is specifically responsible for this phenomenon was investigated. The following operations were done on groups of starving Wistar rats: Ligature of the pylorus, ligature at the boundary, above the limit, and below the boundary of the antrum, resp., and antrectomy. The animals were sacrificed 24 hr. after the operation, the amount and acidity of the gastric juice determined, and the pathological changes on the stomach mucous membrane evaluated. The av. vol. of gastric juice excreted were 20.4, 15.0, 12.0, 18.0, 15.7, and 21.2 ml after ligature of the pylorus, ligature at the boundary, above the boundary, and below the corpus-antrum boundary, antrectomy, and ligature of the duodenum above the common bile duct, resp. The incidence of ulcers in the same groups of rats was 65.0, 62.5, 0, 60.0, 60.0, and 20.0%, resp. The acidity of the gastric juice accumulated after the ligatures varied between 60-70 and 100-110 (U not stated). The only exception was the duodenal ligature, after which the acidity varied between 10-20 and 40-50. Therefore, the incidence of ulcers decreased markedly in this group of rats. In addition to the ligature of the pylorus, other treatments resulting in the prevention of the penetration of the gastric juice into the intestinal tract also led to the development of Shay ulcers in rats. Since antrectomized rats accumulated gastric juice in their stomach and developed ulcers similar to those after ligature of the pylorus, it is evident that gastrin does not play any role in the induction of gastric juice secretion after ligature of the pylorus.

8755 INDIVIDUAL VARIATION IN SECRETORY CAPACITY OF GASTRIC ACID TO STIMULATION WITH SOLID FOOD AND WITH HISTAMINE. (E.) Rune, S. J. (Bispebjerg Hosp., Copenhagen). Clin. Sci. 32(3):443-452, 1967.

The indirect method of estimating the rate of acid secretion after ingestion of solid food (beefsteak and vegetables), by measuring the increase in base conc. in the blood, was applied to 22 persons representing a wide range of secretory capacities of gastric acid. Acid secretion was also estimated after a max. histamine (0.04 mg/kg/hr.) infusion test. The test meal caused a rise in the blood base conc. in 20 of 22 subjects; anacidity was present in 1 of 2 cases, who did not respond to the meal with an increase in base conc.; the second had significant hypoacidity (max. response to histamine was 2 mEq/hr.). The mean rate of aci secretion in the first hr. after a normal meal ranged from 0-56 mEq/hr., with a mean of 31 mEq as compared with a range from 0-59 mEq/hr. (mea 32 mEq/hr.) in acid output in the first hr. of max. histamine infusion test; the individual responses to the 2 stimulations were highly correlated. It is concluded that vagal excitation and gastrin release after ingestion of solid fo provoked max. response by the gastric parietal cell; thus the rate of acid secretion in the ea postprandial peroid depends mostly on the parie cell mass.

8756 GASTRIC MUCOSA SECRETION IN NORMAL CONDITIONS AND IN CASES OF INTESTINAL METAPLASIA. (HISTOCHEMICAL STUDIES). (It.) Gentileschi, E. (U. Rome), V. Speranza, A. Marciani, F. Carotenuto and N. Casale. Gazz Int. Med. Chir. 72(9):721-735, 1967.

The periodic acid-Schiff reaction according to Hotchkiss-MacManus, Alcian blue 8 GS according to Steedman, the Feulgen reaction, and metachromatic staining with Blue A at pH 1 and 3 were the staining methods used. In normal gastric mucosa from 10 surgical patients, the epithelial cells of the upper portion of the gastric fossae stained more intensely with periodic acid-Schiff than those of the lower portion; epithelial cells of the lower portion stained more intensely with Alcian blue than those of the upper portion; metachromasia was observed only in epithelial cells of the lower portion at pH 3 and not at all at pH 1. Mucous cells of the neck of the fundus stained weakly with periodic acid-Schiff and Alcian blue but showed no metachromasia at pH of 3 or 1. Mucou cells of the antral region stained moderately with periodic acid-Schiff but not at all with the other stains. In gastric mucosa of gastric ulcer patients with intestinal metaplasia, goblet cells were scattered among epithelial cells which had lost their mucous activity. These goblet cells stained intensely with periodic acid-Schiff, Alcian blue, and metachromatic staining at pH 3.0; no metachromasia was observed at pH 1.0. Results indicate a predominance of mucoprotein in the secretion o normal gastric mucosa in contrast to a reductio in the number of mucous-secreting cells and a high percentage of acid mucopolysaccharides in the secretion of gastric mucosa undergoing intestinal metaplasia.

8757 THE USE OF INSULIN IN ANALYZING GASTRIC SECRETION. (Rus.) Arabadzhian, V. A. (Med. Inst. Stomatol., Moscow). Sovet. Med. 29(12):84-87, 1966.

Pronounced symptoms of hypoglycemia did not occur in any of 80 patients (duodenal ulcers in 45, gastric ulcers in 11 and chronic gastritis in 24) after inj. of insulin (12 U, admin. s.c.

evacuation of total gastric content). and caffeine stimulants did not provoke cid secretion in 24 patients, insulin ed anacidity in 10 while 14 had normal y. Anacidity was diagnosed by the Boas-test in 10 patients, and was verified by sulin test in only 2. Of 14 showing no cid secretion on a caffeine breakfast, 6 free acid (conc. was normal at times) insulin. Such differences were less pro- d in peptic ulcer patients, i.e., free n conc. more than 40 titer U upon insulin ation occurred in 39 patients, and by the wald and caffeine breakfast in 34; in 6, ee acid indices ranged from 104-120 titer duodenal ulcer cases the free HCl content rkedly higher (27) than in gas-ric ulcer (10) both on an empty stomach and during itial 30-min. of study. Max. acid content 3 Groups was found at 90 min. In chronic tis and gastric ulcer, secretion was n but it was intermittent in duodenal ulcer. eatest amount of juice was found in al ulcer, was lower in gastric ulcer and in chronic gastritis. Max. secretion of c juice occurred 75 min. after insulin The absence of side effects and char- stics of high secretion recommend insulin timulant of gastric secretion, especially sons with a decreased stomach secretory on.

AUTOREGULATION OF THE ANTRAL PHASE OF GASTRIC SECRETION. (Ger.) Lick, R. F. nich, Germany), H. Endres, H. Welsch, t, W. Brückner and O. Beck. *Z. Gastroent.* 8-71, 1967.

emale Heidenhain-pouch dogs (19-21.5 kg) trum was catheterized on the forward wall he greater curvature at the same session. sal secretion was measured 6-8 wk. after ion in the stomach and pouch of each followed by a number of standard tests mine, insulin, etc.), to determine the ory limits of each animal. The antrum was uously perfused through a double-lumen er with buffer soln. having precisely- d pH values; these buffer soln. (1 for eparate perfusion) were phosphate buffers H of 7, 5, 4, and 3 and glycocoll-HCl s having pH of 2.6, 2.4, 2.2 and 2.0, for es; another series was run having identical ues but with meat extract (30 g/liter of) added. The double lumen catheter was o maintain uniform conc. in the antral and also maintain uniform vol. to avoid re changes on the antral walls. Each test actly 1 hr. long. The secretions were ed for the usual parameters; vol., mEq nd pepsin conc. according to standard s. Neutralization of the antrum through uous perfusion with buffer soln. of pH 7 a powerful stimulation of the antral of gastric secretion as measured by pouch ion. (The basal pouch secretion was below 1 ml vol., below 0.01 mEq HCl and 150 U pepsin/hr.). The pouch secretion rose to 22 ml, 1.3 mEq HCl and 6,900 U pepsin/hr. When the buffered perfusate contained meat extract, the pouch secretion rose to 36 ml, 2.1 mEq HCl and 11060 U pepsin/hr. The first increase represented the antral phase of secretion; the second rise was due to gastrin. As the pH of the perfusate was lowered there was relatively less antral secretion phase and relatively more stimulation by gastrin. At pH 4 of the perfusate, the pouch secretion was 11 ml, 0.8 mEq HCl, and 4500 U pepsin/hr. At pH 4 with meat extract, the pouch secretion was 20 ml, 1.53 mEq HCl, and 6500 U pepsin/hr. Perfusion at pH 3 drastically reduced secretion. At pH 2.6 with meat extract there was strong gastric induction of secretion; 7.2 ml 0.3 mEq HCl and 3000 U pepsin/hr. However, at pH 2.2 with meat extract, the secretion was only basal, i.e., the gastrin mechanism was blocked as confirmed by further perfusion experiments.

8759 AN IMPROVED TECHNIQUE OF PERFUSION OF THE STOMACH FOR THE STUDY OF GASTRIC SECRETION IN THE RAT. (E.) Pissidis, G. A. (U. Leeds, England) and C. G. Clark. *Gut* 8(2): 196-197, 1967.

A perfusion technic is described which was designed to eliminate acid level fluctuation in the rat stomach due to inadequate perfusion of the organ by the inlet cathether, and due to irregular evacuation caused by the large size of the gastric rumen. The method is based on saline perfusion of the anesthetized rat stomach followed by measurement of perfusate acidity. A small polythene catheter was introduced into the stomach of the anesthetized rat previously fed dextrose and water for 48 hr. by a duodenal incision distal to the pylorus. The catheter was fixed. Another tube (a tip from a malleable Mackintosh's cocaine spray tube) was introduced into the rumen by an incision in the dome, and tied near the juncture of the body and rumen so as to exclude as much of the rumen as possible. Inlet and outlet tubes were brought through counter incisions in the animal's flanks. The glandular portion of the stomach should not be touched. An air pump sends saline in a fine spray at 35°C, and at a rate of 3 ml/min., through the stomach. Ten to 20 min. of washing the stomach with the saline precedes actual collection of 10-min., 30 ml-samples in graduated glass test tubes. These samples are titrated against 0.001 N NaOH with phenolphthalein. With this method the coefficient of variation is almost always more than 20%.

8760 GASTRIC SECRETION AFTER SIMPLE HISTAMINE STIMULATION IN DIFFERENT MORPHOLOGIC CONDITIONS OF THE MUCOSA OF THE STOMACH. PART I. (Ger.) Kaess, H. (U. Clin. Heidelberg, Germany). *Klin. Wschr.* 45(3):140-144, 1967.

In 96 patients, 32 with a normal gastric mucosa, 12 having light superficial gastritis, 21 severe superficial gastritis, 13 gastritis with atrophy and 18 chronic atrophic gastritis, were each inj. with 0.5 mg of histamine the fractionated gastric juice collected, and a biopsy taken of the gastric mucosa of each subject. The fixed tissues were graded according to pathology: light superficial gastritis showed slightly increased infiltration of lymphocytes, plasmacytes and histiocytes above normal numbers; severe superficial gastritis had a more dense infiltration of lymphocytes and plasmacytes with the addition of polymorphonuclear leukocytes and degenerative changes of the outer epithelium, while new glandular development was normal. Gastritis with atrophy presented an inflammatory type of infiltration, degenerative changes in the surface epithelium, shortening of the necks of glands, partly replaced by an unspecific type of gland; the chronic atrophic form of gastritis was marked by a decrease of glandular parenchyma occurring mostly in the form of lobulated glands, a dedifferentiation of epithelial cells, a rapid metaplasia of goblet cells and increase of lymphatic tissue. There was no case of hypertrophic gastritis among these 96 patients. Tendencies observable from the results of histamine stimulation on gastric secretion compared to the types of gastric pathologies and other factors present are: vol. of gastric secretion decreased with increasing pathological severity; proportionately in the decreasing vol. the acid decreased more rapidly so that the alkaline primary secretion, although about the same in vol., seemed to increase. An upward tendency of age was evident in passing from the normal through light and severe superficial gastritis, gastritis with atrophy, to frank chronic atrophic gastritis. The wide range of acid secretion in the normal and in the pathological conditions limits the diagnostic suitability of this method, despite av. general tendencies.

8761 GASTRIC SECRETION AFTER ORDINARY AND AFTER MAXIMAL HISTAMINE STIMULATION. PART II.

(Ger.) Kaess, H. (U. Clin. Heidelberg, Germany) and E. Oeckinghaus. Klin. Wschr. 45(3): 144-148, 1967.

In 22 patients with normal gastric mucosa, 14 with light superficial gastritis, 31 with severe superficial gastritis, 17 with chronic gastritis with atrophy, and 10 with chronic atrophic gastritis, were treated exactly as the patients in the preceding abstract except that these received 2 histamine inj.; 1 of 0.01 mg/kg (the ordinary dosage) and the other of 0.03 mg/kg (the max. dosage); each inj. was preceded by a basal collection of gastric juice and followed by fractionated collection of stimulated secretion. Again vol. and acidity were measured and the acid and alkaline secretions determined. Gastric mucosa histology was studied in each case and all possible correlations were made between secretions following ordinary and max. dosages of histamine and those of pathological states.
Acid secretion decreased progressively with
increasing severity of gastric mucosal atroph
Acid in mEq/liter/30 min. increased for the
of 22 normal subjects from 6.3 (lower dosage)
9.3 (max. dosage) or an increase of 48%. The
av. of 10 with chronic atrophic gastritis (l
dosage was 1.5 and at the max. dosage 2.3 (a
increase of 54%). Thus there was no impairme
of response of the remaining acid-secreting
cells in the pathological conditions. This
the fact that again the spread of values in
different pathological states was so great s
that no diagnostic importance could be attac
to the av. values or general tendencies obse
These variations were ascribed to neurohumor
influences in various morphologic states of
mucosa. There was no proportionality betwee
submax. and max. stimulation from case to ca

8762 EFFECT OF GASTRIN ON THE RELEASE O GASTRIC FLUID INTO THE DUODENUM IN RAT.

(Fr.) Vasseur, B. (Fac. Med., Paris),
J. Moline, P. Waltzing and P. Harichaux. C.
Soc. Biol. (Paris) 160(11):2192-2195, 1966.

To study the effect of gastrin on the motor
activity of the pylorus, independent of gast
acid activity, the esophagus was intubated a
the duodenum cannulated toward the pylorus i
anesthetized rats permitting the filling of
stomach with physiological saline at moderat
and constant pressure. Electronic transduce
registered the number of openings of the pyl
min. and the number of drops of fluid passin
from the stomach to the intestine. The acid
production of the stomach, induced by like
dosages of gastrin, was measured in control
animals. Gastrin was extracted from the pyl
mucosa of the hog; the standard extract con-
tained 1.5 mg of protein derived from 1 g of
fresh tissue; the upper limit of dosage was
about 50 mg/kg body wt.; the extract had no
contractile activity on the isolated ileum o
the guinea pig, thus excluding the presence
histamine. Extracts were also prepared from
human pyloric mucosa obtained at operation.
All extracts were dilated in distilled water
and inj. i.v. in vol. from 0.2-1.0 ml. The
rapid i.v. admin. of the extract caused a vo
reduction of the release from the pylorus
appearing during the min. following the end
inj. The reduction of the fluid flow varied
from case to case, from complete arrest for
about a min. to a reduction in the number of
drops over 2-3 min. The opening frequency o
the pylorus did not seem to be modified whil
further observation over a period of at leas
min. did not reveal any other motor effect.
the dose of gastrin was reduced the effect o
the vol. flow decreased and tended toward no
The i.v. inj. of physiological saline had no
effect on rate of pyloric opening or on the
of gastric juice passed into the duodenum.
Inj. of a stable ester of choline, carbamin
choline (0.2-1 μg/animal) reproduced faithf
the effect of the extracts upon pyloric mobi
and vol. flow. Slow admin. i.v. of the extr

loric mucosa failed to produce any change
normal. These effects were independent of
cid production of the stomach because no
e in the pH of the physiological saline in
tomach was noted for the duration of the
.

GASTRIN ANTIBODIES: INDUCTION, DEMON-
STRATION, AND SPECIFICITY. (E.)
ider, D. R. (Ohio State U., Columbus), G. L.
l, M. C. Dodd, J. E. Jesseph, N. J. Bigley
. M. Zollinger. Science 156(3773):391-392,

o rabbits were immunized by s.c. and i.m.
of 50 mg of (partially purified) gastrin
e 1, in Freund's adjuvant) weekly for 9 wk.;
was obtained for determination of antibody
s at 3 and 6 wk., and weekly thereafter.
ody titers were determined by a system of
ve hemagglutination. Human Group O RBC
ed with bis-diazotized benzidine were
ed with the following as detector antigen:
l gastrin, a lyophilized preparation of
ins I and II, gastrin pentapeptide and
in tetrapeptide. RBC exposed to antigen
ut pretreatment with bis-diazotized benzidine
ot show hemagglutination in the presence of
ody, presumably because of failure of the
to bind the antigen. RBC treated with bis-
tized benzidine, but not coupled with
en, also showed no hemagglutination. When
ins I and II were used as the detector
en, complete antibody titers of 256, 128
12, resp., were determined in 3 rabbits 6
fter initial immunization. Comparable titers
determined by Stage-I gastrin, gastrin
peptide, or gastrin tetrapeptide as detector
en coupled to the RBC. Goat antirabbit
bulin used in the detection procedure
ased the titers to 1024, 512 and 2048, resp.
ficity of the antibody, as determined by 3
ds: hemagglutination with gastrin penta-
de, gastrin tetrapeptide, Gastrins I and II
tage-I gastrin, as detector antigens on the
inhibition of passive hemagglutination; and
antibody activity was completely absorbed
C coupled with Gastrins I and II, gastrin
peptide or gastrin tetrapeptide, was directed
strins I and II, gastrin pentapeptide,
in tetrapeptide and Stage-I gastrin used
mmunization.

ISOLATION OF A CARRIER OF VITAMIN B_{12}
IN THE GASTRIC MUCOSA OF THE HOG.
Carlier, A. (City Hosp., Lille, Nord,
e), C. Boulanger, R. Havez and G. Biserte.
Acad. Sci. [D] (Paris) 264(18):2240-2243,

tract in 2% NaCl of the pyloric mucosa of
og was fractionated with $(NH_4)_2 SO_4$ after
uction of pepsin at pH 9.0. An auto-
graph was prepared by addition of $^{60}CoB_{12}$,
removal of excess free cyancobalamine by chromatography; the protein vitamin B_{12} complex was found in the region of the β globulins. Rabbit immunoserum was prepared from this material; immunoelectrophoresis of the proteins of hog serum mixed with the protein vitamin B complex differentiated the protein of the pyloric mucosa from all others. The protein itself was further conc. on a Sephadex column and proved to be homogeneous on electrophoresis on agar; this material seemed identical with the protein of the complex. High voltage electrophoresis finally separated it into 4 close fractions, the fourth of these was the carrier of the cyancobalamine. Thirteen mg of this fraction were obtained by the high voltage electrophoresis method. The molecular wt. of this substance was the lowest (among the protein substances) in the mucosal extract. The approx. molecular wt. (obtained by ultracentrifugation) was 4395±215 and is much smaller than that reported by others for the intrinsic factor of the hog. Nevertheless this preparation possesses the proper affinity for union with B_{12} and still preserves the specific antigenic determinant of hog intrinsic factor.

8765 A NEW ENZYME IN HUMAN GASTRIC JUICE. IMMUNOLOGIC, ELECTROPHORETIC AND ENZYMATIC PROPERTIES OF A CARBOXYLIC ESTERASE LOCATED IN THE GASTRIC MUCOSA WITH THE CAPACITY TO BIND VITAMIN B_{12}. (Ger.) Rapp, W. (U. Clin. Heidelberg, Germany). Klin. Wschr. 45(10): 533-541, 1967.

The normalcy of the gastric juice from 20 normal donors was determined from amount, pH, titration of free and bound acid, total wt. of pepsin, electrophoretic determination of pepsin, total protein, and, in 7 cases, histologic studies. Different gastric fractions were obtained: fasting, basal, and histamine-induced. The gastric juice was centrifuged to eliminate mucin; the supernatant (gastric juice) was cooled to 4°C and part of this juice lyophilized at pH 6.0-6.5. Postoperative human gastric mucosa was obtained and extracted. Gastric juice and mucosal extract each underwent electrophoretic separation and pepsin was removed from the gastric juice. Immunoelectrophoretic analysis and Ouchterlony preparations followed, allowing semi-quantitative determination of the esterase as an antigen. Through several stages of immune sera (prepared in the rabbit) to the use of the monospecific antiserum against the gastric juice esterase, successively purer preparations were made. Monospecific fluorescent antibodies (Coons) showed the intracellular presence of the enzyme in sections of frozen human gastric mucosa. This carboxylic esterase was found in the microsomal fraction of the fundic mucosa. The electrophoretic mobility corresponded to the β-1/γ-Ig G region in agar-gel electrophoresis at pH 8.2. This enzyme is a glycoprotein with excellent antigenic properties. The identity of this secreted antigen with the previously described antigen VIA has been proven by immunologic and biochemical methods. This antigenic enzyme can bind Vitamin B_{12} and corresponds to the slow vitamin B_{12} binder in gastric juice. The relationship to the intrinsic factor is almost certain. There are far-reaching biochemical reactivities identical for the human intrinsic factor and this carboxylic esterase. The 2 occupy identical positions in the chromatogram; the same positions chromatographically are occupied by a Vitamin B_{12} transfer factor, the intrinsic factor, and the autoantigen in pernicious anemia patients. A significant diminution of this esterase in pernicious anemia, gastric carcinoma and mucosal atrophy was observed in preliminary studies. As an enzyme it has a pH optimum of 6.6. Using β-naphthylacetate as substrate (1.075 mM) the reaction was linear; 20% of the substrate was converted in 3-10 min. Ca is apparently required for activation.

8766 EXCRETION OF PARENTERALLY ADMINISTERED LABELED VITAMIN B_{12} INTO THE RAT SMALL INTESTINE. (Hun.) Romics, L. (Budapest Med. U.) and M. Stützel. Kiserl. Orvostud. 19(1):48-54, 1967.

Vitamin B_{12}-Co^{58} (120 ng; specific activity 2 mc/mg) was inoc. into the tail vein of 3 groups of starving white rats. The second Group received the labeled vitamin after ligature of the common bile duct. In addition to this ligature, partial pancreatectomy was done on the third group before vitamin admin. All operations and inj. were carried out under narcosis (i.p. admin. of hexobarbital). The animals were sacrificed 1 and 24 hr. after vitamin admin., resp. After 24 hr. the kidneys and the collected urine, contained an av. 27%, the liver 7%, and the stomach, intestinal tract, and collected feces 15% of the input radioactivity. Distribution of the isotope did not change after ligature of the common bile duct or partial pancreatectomy. The bulk of the activity of the gastrointestinal tract was in the intestinal tract, where it was evenly distributed between the intestinal wall and the lumen. Ligature of the common bile duct or partial pancreatectomy did not change this pattern. Similar results occurred when the isotope distribution was investigated 1 hr. after labeled vitamin admin. The vitamin is excreted through the intestinal wall into the lumen. This process seems to be an active secretion, because admin. of 500 µg of cold vitamin B_{12} into the jejunum failed to inhibit the penetration of the label into the intestine and to affect its distribution between the intestinal wall and the intestinal content. Paper chromatography indicated that the radioactive compound in the intestinal tract was labeled vitamin B_{12}, rather than its degradation product.

8767 INTRINSIC-FACTOR SECRETION IN RESPONSE TO PENTAGASTRIN. (E.) Shearman, D. J. C. (U. Edinburgh, Scotland), N. D. C. Finlayson, I. M. Murray-Lyon, R. R. Samson and R. H. Girdwood. Lancet 2(7508):192-194, 1967.

In 15 patients with a variety of disorders, synthetic pentapeptide, pentagastrin (6 µg/k admin. s.c. or 6 µg/kg/hr., admin. i.v.), pr duced a similar gastric acid response as aug mented histamine (0.04 mg/kg s.c. or 0.04 mg/kg/hr., i.v.) stimulation. In 15 patient (7 of whom were achlorhydric) preliminary re suggested that these drugs also produce simi amounts of intrinsic factor. Patients were selected to cover the acid range 0-49 mEq. 1 patient complained of nausea in response t pentagastrin in contrast to 8 patients who h striking flushing and/or headache with hista It is concluded that, due to infrequency of side-effects, pentagastrin may be the stimul of choice in anemia or cardiovascular disord in the aged. This infrequency of side-effec also suggests the possibility of its increas ing the efficacy of screening tests for achlorhydria using Azure-A ion-exchange resi

8768 COMPARATIVE STUDY OF THE MODE OF STIMULATION OF INTRINSIC FACTOR. Tura, S. (U. Bologna, Italy), F. Possati, E. Fiore and L. Lodi. Boll. Soc. Ital. Biol Sper. 43(3):159-160, 1967.

The effects of histamine (0.02 mg/kg), betaz hydrochloride (1 mg/kg), and a mixture of am acids obtained by enzymatic breakdown of gel (450 mg) on acid secretion and intrinsic fac production were studied in 15 subjects with radiological, functional, or biopsy evidence gastrointestinal pathology. Two of the agen were admin. parenterally. Intrinsic factor determined by the radioimmune method. Gastr juice was collected over a 1-hr. period. Ac and intrinsic factor conc. was 19.47 mEq/hr. 7521 U, resp., with a correlation coefficien 0.77, after betazole; 15.2 mEq/hr. and 6205 resp., with a correlation coefficient of 0.8 after histamine; 7.9 mEq/hr. and 5424 U, res with a correlation coefficient of 0.76, afte amino acid mixture. Results indicate greate acid and intrinsic factor production followi histamine and betazole admin. than after a m ture of amino acids. Histamine causes less and intrinsic factor production than does be the difference between the 2 being statistic significant. An elevated correlation coeffi between acid and intrinsic factor production existed for all 3 agents.

8769 COMBINED ACTION OF ACETYLCHOLINE A HISTAMINE ON PEPSIN PRODUCTION IN STOMACH. (Rus.) Grechishkin, L. L. (Inst. Exper. Med., Leningrad, USSR). Farmakol. Toksik. 29(6):691-695, 1966.

Sensitivity of the chief cells (pepsin-formi of the gastric mucous membrane to acetylchol under the action of histamine (1 mg every 2

. s.c.) was studied in dogs (15-20 kg) with
ic fistulas. In 5 dogs treated with acetyl-
ne (15 μg/kg/min. for 80 min., admin. i.v.)
, the vol. of gastric juice/hr. during max.
tion varied between 15-42 ml, its pH was
.7; the pepsin conc. varied between 1.15-1.57
and the pepsin yield/hr. varied between
58.8 mg. In the same animals treated with
lcholine (15 μg/kg/min. for 60 min., admin.
and histamine, the resp. values were,
ic juice vol./hr., 145-165 ml, pH 1.3-1.55,
n conc. 1.00-1.48 mg/ml, and pepsin yield/hr.,
-244.2 mg. In 5 dogs treated with acetyl-
ne (1 μg/kg/min. for 60 min., admin. i.v.),
ic secretion was absent in 3 and only a
amount of mucus was secreted in 2; mucus
was 1.0 or 2.0 ml, pH was 6.0-7.5, pepsin
0.1-0.2 mg/ml, and pepsin yield/hr. was
.4 mg, resp. In the same dogs treated with
lcholine in a small dose and histamine,
ic juice vol./hr. varied between 115-180 ml,
tween 1.35-1.50, pepsin conc. between
0.64 mg/ml and pepsin yield/hr. between
95.3 mg. Pepsin yield, as found under
ic experimental conditions (in 2 dogs) with
min. of acetylcholine (1 μg/kg/min.) by
nged arterial infusion into the brain, did
xceed that after i.v. admin. of acetylcholine
e same dose, i.e., the av. pepsin yield/6
iments after i.v. admin. was 76.0 mg, and
intra-arterial admin. it was 70.6 mg.
fore, the potentiating effect of histamine
psin yield was not stimulated after intra-
ial admin. of acetylcholine; this indicates
the potentiating action of histamine occurs
e gastric wall periphery i.e., where histamine
f yields a secretory effect. Histamine, in
dmin. doses, did not depress the ability of
hief cells to yield pepsin.

THE LABELING OF PEPSIN BY ^{51}CrCl$_3$.
CHOICE OF TECHNICAL CONDITIONS AND
OLS. (Fr.) Cohen, Y. (Bichat Hosp., Paris),
anchard-Pelletier and S. Bonfils. C. R.
Biol. (Paris) 160(12):2272-2276, 1966.

echnic of marking pepsin with ^{51}CrCl$_3$ is
ibed. Material included: a 1% freshly
red soln. of twice-crystallized pepsin and
n. of ^{51}CrCl$_3$ of more than 2 mc/ml diluted
a soln. of CrCl$_3$ to contain a final titer
μg/ml of Cr. Marking the pepsin included:
of pepsin soln. and 200 μc of ^{51}CrCl$_2$ are
for 45 min at 37°C. Method of study of
arking included: Electrophoresis on paper
rious pH (6.9, 5.5, 1.6, 1.2, different
rs), 3 volts/cm^2 4-6 hr.; ninhydrin reaction
ach amide; another part of paper in contact
Kodirex film; electrophoresis in gelatin
combined with autoradiography using a pepsin
ence standard; purification of the marked
n by removal of all radioactive isotope not
by the enzyme through (a) mixing with
(Dowex) recovering supernatant and wash-
(b) dialysis through cellophane (Nojax 26)
of soln. against 50 ml H$_2$O at 4°C for 24 hr.,
or (c) chromatography on column of Sephadex G-25 20 cm long and 2 cm diameter; elution fluid, pH 6.0; 0.5 ml fractions. An alternate method with the column is given. Results: electrophoresis on paper; pH 6.9, 1 radioactive band at the anode; pH 5.5, 1 radioactive band at anode 1 band not radioactive at cathode; no migration at pH 1.6; at pH 1.2, 1 radioactive band at the anode. Electrophoresis in gelatin with reference standard showed peptic activity, not impaired by marking. The separation on the Sephadex G-25 column proved to be the most efficient.

8771 COMPARATIVE HISTOCHEMICAL STUDIES ON THE EPITHELIAL SECRETION OF THE GALL-BLADDER IN VERTEBRATES. (Fr.) Oledzka-Slotwinska, H. (Inst. Histol. Embryol., Acad. Med., Szczecin, Poland). C. R. Ass. Anat. 51(136):951-955, 1967.

Of 9 species studied, the amount of secretion in the frog, snake, and turkey was very small. In all species a complex mucoprotein was present; the protein portion gave a faintly positive Millon test. Secretion in animals with weak mucopolysaccharide reactions did not show strong protein reactions. The saccharide portion of the mucoprotein is probably a fucomucin while the acid radicals of the mucopolysaccharides are sulfuric and carboxylic. In the salamander, frog, snake and turkey, mucopolysaccharides with carboxyl groups predominate whereas in the tortoise, goose, dog, cat and man the sulfuric groups are chiefly present. The presence of chondroitin sulfuric acids A and C in the mucopolysaccharides of the secretions examined is doubtful. A principal source of the sulfuric radical seems to be heparin monosulfate. Sialic acid is the source of the carboxylic group.

8772 ACTION OF ATROPINE ON PANCREATIC AND BILIARY SECRETIONS IN THE RAT. CHOLERETIC EFFECT. (Fr.) Debray, C. (27 Rue Galilee, Paris), C. Vaille, J. De La Tour, C. Roze and M. Souchard. Gastroenterologia (Basel) 106(6):336-344, 1966.

Rats under urethane anesthesia were catheterized so that pancreatic juice and bile were separately and totally recovered. Temperature was maintained at 38 ± 0.5°C and respiration was recorded through changes in thoracic vol. After 6 hr. of observation and determination of basal secretory vol., the rats were inj. i.v., with atropine sulfate (30 mg/kg) and 15 min. later with a second dose of the same strength. These doses were much stronger than those in humans and dogs due to low sensitivity to this alkaloid. Bile production and the pancreatic juice were measured. The amplitude of respiration, the frequency, and their product, (amplitude frequency) were recorded. Results of groups of 10 rats receiving atropine were av., as were those of 10 control rats receiving appropriate saline inj. Results of biliary, but not pancreatic secretions, are recorded as net changes in vol., i.e., the subtraction of the vol. per unit time before the inj. from that after the inj. No significant decrease in pancreatic secretion was observed. During the course of the third hr. the vol. of pancreatic secretion increased rapidly compared to controls. Ten controls showed an av. of 3.40 (units not given) in the 3rd hr., and 10 rats with atropine in the same hr. av. 4.66 or 1.22 more, (36% more). In the previous hr. (second hr.) the experimental value was 28% more. Bile secretion in experimental animals increased about 46% in the first hr., 28% in the second and 10% in the third hr. (3 hr. av., 28%). In the same time, controls showed a total drop of 9%. Respiration in animals receiving 60 mg/kg of atropine sulfate was enhanced in an irregular manner; amplitude, and, generally, frequency were variable although above normal.

8773 COMPARISON OF THE ACTION OF MORPHINE, CODEINE AND NICOCODINE ON THE RESPIRATION AND THE EXTERNAL PANCREATIC AND BILIARY SECRETIONS OF THE RAT. (Fr.) Vaille, C. (Hosp. Bichat, Paris), C. Debray, J. De La Tour, C. Roze and M. Souchard. Arch. Int. Pharmacodyn. 167(1): 115-134, 1967.

Inj. of 0.01 and 0.02 g/kg of morphine HCl, 0.02 g/kg of codeine or 0.01 of 6-nicotinoylcodeine (Nicocodine) in male rats anesthetized with urethane for the performance of a double fistulization of the common bile duct demonstrated that these related drugs caused different pancreatic responses. Morphine, more than codeine, increased the flow of the pancreatic secretion while 6-nicotinoylcodeine had no effect. The amylase rate was slightly increased by morphine and codeine, while the total protein conc. was not significantly altered. Nicotinoylcodeine caused no changes. Morphine and nicotinoylcodeine did not alter the normal bile flow whereas codeine caused choleretic action for more than 1 hr. Choleresis was increased 40-50%, returning to normal within 2 hr. At the same time (with codeine) there was an initial decrease in bilirubin excretion during the hypercholeresis; it returned to normal and finally to slightly above normal. The bilirubin flow remained unchanged as the diminution of conc. was compensated by bile flow increase. Morphine and nicotinoylcodeine did not modify the excretion of bilirubin. The total enzyme flow (expressed by the conc. of proteins) was not significantly modified by any of these 3 drugs. At the conc. used, no mortalities occurred with either codeine or nicotinoylcodeine, but at the dose of 20 mg/kg of morphine, 5 of 11 rats died. All 3 depressed respiration: morphine more than codeine and codeine more than nicotinoylcodeine.

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8777 THE PREPARATION AND MAINTENANCE OF GASTRIC POUCHES. TECHNIQUES OF GAS POUCH PREPARATION IN DOGS. (E.)(Rev.) Rudic J. (U. Washington Sch. Med., Seattle), L. S. Semb and L. M. Nyhus. J. Surg. Res. 7(8): 383-398, 1967.

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8782 EXOCRINE PANCREATIC ACTIVITY DURIN WATER DEPRIVATION AND SUBSEQUENT S DRINKING. (Rus.) Enikeev, M. V. (Tashkent Inst. Postgrad. Med., USSR). Med. Zh. Uzbek. (4):26-27, 1967.

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8793 DETERMINATION OF THE IONIZATION CONSTANTS OF THE FUNCTIONAL GROUPS OF THE ACTIVE CENTER OF PEPSIN. (Rus.) Lutsenko, N. G. (Inst. Chem. Nat. Compounds, Moscow), L. M. Ginodman and V. N. Orekhovich. Biokhimiia 32(2): 223-227, 1967.

The kinetics of the enzymatic hydrolysis of 2 synthetic substrates of pepsin, N-acetyl-L-phenylalanyl-L-tyrosine and N-acetyl-L-phenylalanyl-L-tyrosine ethyl ether, at different conc. of substrates and at different pH values, was investigated and on the basis of experimental data, the pK values of functional groups of active enzymatic centers were determined. Values of the kinetic constants K_m and k_{+2} at different pH values (1.5-5.5) were obtained by investigation of the dependence of hydrolysis velocity on the substrate conc. (0.00025-0.005 M). Analysis of the dependence of lg k_{+2} and lg $\frac{k_{+2}}{k_m}$ on pH revealed the presence of a functional group with pK 3.0 in the active center of the free enzyme; the enzyme-substrate complex had a functional group with pK 3.8 (hydrolysis of N-acetyl-L-phenylalanyl-L-tyrosine) and with pK 4.2 (hydrolysis of N-acetyl-L-phenylalanyl-L-tyrosine ethyl ether). It can be assumed that the relatively low value of the pK group of the free enzyme is conditioned by its interaction with adjacent carboxyl groups. Upon formation of the enzyme-substrate complex, the interaction of the carboxyl groups is discontinued and the pK values acquired regular values characteristic for β- or γ-carboxyl groups of dicarbonic amino acids.

8794 SPECIFICITY OF BILE SALT PROTECTION OF CHOLESTEROL ESTER HYDROLASE FROM PROTEOLYTIC INACTIVATION. (E.) Vahouny, G. V. (George Washington U. Sch. Med., Washington, D. C.), H. Kothari and C. R. Treadwell. Arch. Biochem. 121(1):242-244, 1967.

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REFLEX AND ELECTROMYOGRAPHIC ABNORMAL-
ITIES ASSOCIATED WITH FECAL INCONTINENCE.
Alva, J. (Baltimore City Hosp., Md.), A. I.
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hnic is described for obtaining simultaneous
etric recordings of reflex responses from
internal and external anal sphincters along
electromyographic activity from the external
ncter. A total of 25 normal subjects were
ied and compared to 12 patients with gross
incontinence; 5 of the latter had intact
ilature but disrupted innervation due to
r complete transection of the lumbar spinal
or partial transection as a result of spinal
tumors; 2 had intact innervation but had
ary muscle disease and 5 patients had injury
al musculature secondary to surgical trauma.
combined technic showed that in the normal
ing state, the internal sphincter was strongly
racted and the external sphincter minimally
racted. Rectal distention produced a tran-
burst of increased activity beyond that
rved in resting muscle. The degree of in-
al sphincter relaxation and external sphincter
raction was directly proportional to the
ee of rectal distention. In patients with
incontinence, normal internal sphincter
exes were present, but external sphincter
exes were absent in incontinence regardless
e underlying cause, indicating that of the
scle components, the external sphincter plays
major role in the preservation of continence.
athy was demonstrated electromyographically
e external sphincter of patients who had
tinence associated with myopathy of other
les.

STUDIES ON ANTISPASMODIC AND GENERAL
PHARMACOLOGICAL ACTIONS OF 3-BROMO-4-n-
XY-BENZOIC ACID DI-n-BUTYLAMINOETHYLAMIDE.
.) Kameyama, T. (Tohoku Coll. Pharm.,
ai, Japan) and K. Sasaki. Yakugaku Zasshi
Pharm. Soc. Jap.) 87(4):370-375, 1967.

spasmodic action was tested in 67 basic amides
alkamine esters using the excised intestine
ale mice in the Magnus method. In general,
e compounds had a strong papaverine-like
on; some of the basic amides showed atropine-
activity. One compound, 3-bromo-4-butoxy-
oic acid dibutylaminoethylamide, when tested
he Magnus method showed an antibarium chloride
on 3.94 times that of papavarine; its anti-
ylcholine activity was 0.0071 times that of
pine. This compound had a marked inhibitory
on on the contraction of rabbit intestine
ivo (Trendelenberg's method) in a conc. of
/kg body wt. inj. i.v. Acute toxicity of
omo-4-butoxybenzoic acid dibutylaminoethyl-
e was 218.5 mg/kg by s.c. inj. in mice.
tional extraintestinal responses are described.

8805 EFFECTS OF MORPHINE UPON THE ISOLATED SMALL INTESTINE OF RATS, RABBITS AND GUINEA PIGS. (E.) Hukuhara, T. (Okayama U. Med. Sch., Japan), H. Fukuda and T. Neya. Jap. J. Physiol. 16(5):528-540, 1966.

In most cases, morphine has an excitatory action upon the motility of the isolated small intestine of guinea pigs, rats and rabbits. The threshold conc. was found to be 10^{-10}, 10^{-7} and 10^{-6} g/ml, resp. At lesser conc. the contractions were increased in their amplitude with or without being accompanied with a rise of tone, while, at higher conc., there was a pronounced increase in tone which often culminated in its extreme to produce disordered contractions. With rats the admin. of the ganglionic blocking agent, nicotine (5×10^{-5} g/ml), along with morphine, produced a transitory inhibitory response 50 sec. later, which was followed by an excitatory response comparable to that obtained with morphine alone. This morphine excitation was not altered by the admin. of hexamethonium (5×10^{-4} g/ml) or atropine (10^{-4} g/ml). Furthermore, the admin. of morphine did not alter either the inhibitory response caused by the stimulation of mesenteric nerves nor the excitatory response produced by the admin. of a ganglionic stimulating agent, 1,1-dimethyl-4-phenyl-piperazinium iodide. These data suggest that the morphine excitatory effect on intestinal motility is due to its direct action on the muscle itself rather than by intramural nervous elements. Studies on the guinea pig and rabbit supported this conclusion.

8806 THE EFFECT OF STIMULATION OF THE HYPOTHALAMUS ON THE MOTOR ACTIVITY OF THE SMALL INTESTINE ON THE BASIS OF THE ACTIONS OF ACETYLCHOLINE AND EPINEPHRINE. (Uk.) Koval, L. O. (Shevchenko Inst. Physiol., Kiev, USSR). Fiziol. Zh. (Kiev) 13(2):244-256, 1967.

In a chronic experiment on fasted dogs (4) with electrodes implanted in the hypothalamus and equipped with small intestine fistulas, the action of electric stimulation (0.1-0.5 milliamperes, 50 hertz) of different parts of the hypothalamus on the motor activity of the small intestine was studied before and after the s.c. admin. of acetylcholine (0.2-1.5 mg/kg) or the i.v. admin. of epinephrine (0.005-0.02 mg/kg). Acetylcholine (1.0-1.5 mg/kg) always provoked or increased the motor activity of the small intestine. In a dose of 0.2-0.5 mg/kg, the action of acetylcholine on motor activity of the small intestine was dependent upon the functional status of the latter, i.e., during the first 3-5 min. of the resting period, the intestinal motor activity remained unchanged; if admin. later in the resting period, a local motor reaction occurred and it was increased. Admin. of acetylcholine during the period of intestinal action increased its contractions, with an increase in tonus.

Acetylcholine, given during the active intestinal period immediately after increase in motor activity (3-6 min. duration), caused motor activity to decrease to initial values or even caused slight inhibition. The action of epinephrine on the motor activity was also dependent on the functional status of the intestine. The strongest inhibition of the intestinal contractions was obtained after admin. of epinephrine at the start of the active period. After the inhibitory phase, stimulation of the intestinal motor activity was often observed. Admin. of epinephrine during the resting period could result in a stimulation phase, which sometimes lapsed into the active intestinal period. Stimulation of the anterior and central parts of the hypothalamus (0.1-0.3 milliamperes) during the state of rest or low contractions of the small intestine caused stimulation of motor activity and an increase in intestinal tonus (here, also, functional status of the intestine was of importance), while stimulation of the posterior part of the hypothalamus resulted in stimulation with a somewhat increased latent period. Stimulation of the anterior and central parts of the hypothalamus, at the time of stimulation of motor activity provoked by acetylcholine (Phase 1) or epinephrine (Phase 2) caused even greater motor activity in the intestine than without these substances. Low stimulation of the hypothalamus in the first 3-6 min. after initiation of the rest period did not cause stimulation of motor activity. Stimulation of the hypothalamus (0.1-0.2 milliamperes) at the time of Phase 2 of acetylcholine action had slight or no stimulatory effect; stimulation at points close to the mammillary bodies could have either stimulatory or inhibitory effects. Stimulation of the anterior and central parts of the hypothalamus under the inhibitory action of epinephrine had no effect on intestinal motor activity. Stimulation of the hypothalamus at the moment when Phase 2 of epinephrine action developed, or at the time when it usually developed, caused a greater degree of motor activity in the small intestine than without preliminary admin. of acetylcholine or epinephrine.

8807 CHRONIC IN SITU STUDIES OF THE ELECTRICAL ACTIVITY OF THE SMALL INTESTINE. (E.) Bunker, C. E. (Stanford U. Sch. Med., Palo Alto, Calif.), L. P. Johnson and T. S. Nelsen. Arch. Surg. (Chicago) 95(2):259-268, 1967.

Long-term, chronic in situ studies of the slow-wave electrical activity of the canine small intestine were performed on alert, unanesthetized dogs. The slow waves in the intact animal were stable under a variety of conditions for prolonged tests. After standard testing, surgical procedures performed on several dogs included bilateral transthoracic vagotomy, complete transection and immediate reanastomosis of the third portion of the duodenum, complete transection and immediate reanastomosis of the duodenal bulb, construction of Thiry fistulae from the third portion of duodenum and proximal jejunum and dissection of all tissue attached to the duodenal bulb. Mean slow-wave frequency was measured at all levels of the small intestin and the frequency defined; slow-wave frequencies of approx. 19 cycles/min. were usually found proximally, decreasing to 13-14 cycles/min. in the terminal ileum; this fall-off did not begin until well down into the mid-jejunum at a level of 75-90-cm from the ligament of Treitz. The normal frequency gradient was drastically altere by transection of the small intestine distal to the second portion of the duodenum, supporting the concept of a pacemaking area in this region. In the animal in which Thiry loops were construc from segments of duodenum and jejunum, all frequencies distal to the most cephalad anastomo (in midduodenum) were statistically the same and equal to those in the terminal ileum; also, mear slow-wave frequencies in the 2 isolated loops themselves were also at this same rate of approx 13 cycles/min., considerably different from thei preoperative values of approx. 19 cycles/min. I.v. admin. of 1 ml of a 1:1000 soln. of epinephrine produced striking increases in slow-wav rates. S.c. epinephrine in doses of 0.5-1.0 ml of the 1:1000 soln. produced no significant alte tions in frequencies. After rapid i.v. inj. of 1.2 mg of atropine, there was a slight fall in frequencies occurring soon after inj. and lastin over 1 hr. Vagotomy done in 1 animal produced results quite similar to that of atropinization, i.e., a fall in frequency of approx. 1 cycle/mi in the cephalad electrodes. In all animals, the admin. of i.v. insulin did not significantly alt slow-wave frequencies from fasting control value in general, feeding a standard amount of a commerical dog food preparation also had no effect mean frequencies, with a few exceptions. During occasional individual tests, a transient fall of approx. 1.0 cycle/min. was seen immediately afte feeding and lasted 5-10 min.; however, frequenci then returned promptly to fasting levels for the remaining 1-2 hr. of the tests, so that mean val for the entire postprandial period were unchange It is suggested that small intestinal smooth mus has a basic intrinsic rate of slow-wave activity which is much slower than that found in most of intact intestine distal to the second portion of the duodenum. The observed frequencies and grad ient in the intact intestine is presumably due t the action of a pacemaking area situated at or n the ampulla of Vater. The gradient can be viewe as (resulting from) a series of loosely coupled relaxation oscillators whose effect is conducte by the muscle itself. The degree of coupling to the proximal, faster activity is diminished with distance, thus accounting for the decreasing gradient of frequencies. Transection distal to the second portion of the duodenum interrupts communication with the pacemaker.

8808 EFFECTS OF N,N'-DIPHENYLDICARBAMATE-1 DIMETHYLOL CYCLOPENTANE (CAMALON) ON THE GASTROINTESTINAL MOTILITY IN RABBIT. (E.) Shimamoto, K. (Kyoto U., Japan), H. Hikosaka an T. Kiba. Acta Sch. Med. Univ. Kioto 39(3):180-184, 1966.

asmolytic effect of Camalon was investigated
rabbit upon the isolated intestine and
and upon movement of the stomach and
r in situ. Movements of strips of ileum
erus, suspended in oxygenated Ringer-Locke
maintained at 37.5°C, were recorded on
paper; the drugs used were admin. in the
conc. were given as g/ml. Large rabbits
ntubated with a gastric tube and balloon
with water; the vol. of water was adjusted
e the max. gastric movement. Bladder move-
were recorded using a bladder catheter,
g the bladder with Ringer's soln. warmed
5°C; stomach and bladder movements were
ered by tambour; drugs for stomach and
r tests were admin. by ear vein. Camalon
sted against or compared to $BaCl_2$, acetyl-
e, physostigmine, vasopressin, atropine,
rine and epinephrine. Camalon exerted
ic effects in the isolated intestine;
tation of motility in low conc. (2 x 10^{-7}-
$^{-5}$); above 1 x 10^{-5} the motility was
lly or progressively depressed in both fre-
and amplitude. The high conc. of Camalon
sed the stimulating effects of acetylcholine
Cl_2 on intestinal motility. This also oc-
with the uterine tissue; in addition, the
of epinephrine was diminsihed. The relax-
ffect of Camalon (1-3 mg/kg) on the move-
of the stomach lasted for 20 min. or more.
elaxing effect was more marked when the
ents had been augmented by i.v. inj. of
stigmine or vasopressin. The same dose of
on depressed the spontaneous movements of the
er in frequency and amplitude.

INFLUENCE OF STIMULATION OF THE AMYGDALA
ON ALIMENTARY MOTOR CONDITIONED REFLEXES
TOGENESIS IN DOGS. (Rus.) Vavilova, N. M.
ov Physiol. Inst., Koltushi, USSR). Zh.
. Nerv. Deiat. Pavlov 17(2):240-248, 1967.

ffects of unilateral electrical stimulation
e amygdaloid complex and body on conditioned
xes were studied in 17 randomly-bred dogs
mo. old). Insertion of bipolar electrodes
the left amygdaloid was followed, 2 days
surgery, by stimulation, which was applied
0-15 days. Stimulation was done with im-
generator IG-10; the frequency was usually
rtz, duration of impulses, 0.5 msec., stim-
on strength, 0.5-15 volts and duration of
lation, 30-40 sec. Electrical stimulation
e amygdaloid in dogs of various ages caused
kedly pronounced complex of nutritional
entary) behavior (licking, salivation, mas-
ion) as well as orienting and olfactory
ions. The threshold of stimulation (at
characteristic behavior reactions occurred,
.5-1.0 volts, and was approx. the same dur-
ll growth periods. In 2 animals (6-7 mo.
with electrodes localized in the pyriform
us toward the front of the amygdaloid com-
the most characteristic reactions were
catory. In all groups of animals studied,
lation of the amygdaloid body alleviated
the earlier-produced motor food conditioned reflexes. Stimulation, which caused a defensive reaction, inhibited conditioned reflexes chiefly in older dogs. In 3-4 mo. old puppies, stimulation of the amygdaloid body (used on the base of a differential signal) released differentiation, and in 6-7 mo. old animals, the latter was preserved. In 2 animals with electrodes placed in the pyriform region, electrical stimulation produced positive reactions similar to those which appeared upon amygdaloid stimulation, although mastication reactions were more pronounced. Therefore, besides other functions of the amygdaloid body, it is one of the segments of the nutritional multistage center.

8810 ON THE RAT GASTRIC MOTILITY. (E.) Hukuhara, T. (Okayama U. Med. Sch., Japan) and T. Neya. Jap. J. Physiol. 16(5):497-508, 1966.

In vivo studies of the adult rat stomach showed that gastric peristalsis always started every 10 sec., seen as a ring of contractions which was projected through the root of the left gastric artery at right angles to the curved long axis of the stomach (termed the pacemaker area). The muscle in this area contracted almost synchronously: the ring of contraction slowly propagated towards the pylorus with a velocity of about 1 mm/sec. Bilateral section of the vagus and/or the splanchnic nerves did not alter the site of initiation of these peristaltic waves. In vitro studies of the stomach showed the appearance of similar peristaltic waves but, unexpectedly, the pacemaker shifted and the peristalsis started at the top of the pars proventricularis and swept downward as a wave band to the former pacemaker region. When studies were made on various stomach strips the frequency of contractions was greatest in the fundic strip, nearly as great in the pacemaker strip, lowest in the sphincter strip, while the body strip was between the latter two. The strips made from the upper stomach regions contracted with a regular rhythm, whereas those made from the lower regions contracted irregularly. When physostigmine was applied, the frequency of contractions was hardly increased in either the fundic or pacemaker strips and only slightly in the body, whereas the sphincter and pyloric strips were remarkably stimulated. In short, the pyloric and sphincter strips showed the lower tone superimposed with rhythmic contractions of great amplitude, while the pacemaker and body had a higher tonicity but rhythmic contraction of a smaller amplitude.

8811 THE CORTICAL LOCALIZATION OF AFFERENT VISCERAL FUNCTIONS AND THEIR CONNECTIONS WITH THE NONSPECIFIC BRAIN SYSTEMS. (Rus.) Tolmasskaia, E. S. (Psychiat. Res. Inst., Moscow). Zh. Vyssh. Nerv. Deiat. Pavlov 17(2):295-303, 1967.

In man (11 healthy persons), the potentials provoked during stimulation of skin and gastric mucosal receptors had a latent period from 75-100 msec., with an amplitude of phases up to 80-90 msec. According to the latent period, they could be related to secondary induced potentials, but their localization in the cortex was different. Upon stimulation of gastric mucosal receptors, the provoked potentials as well as the reaction of desynchronization, were localized in the precentral and frontal region of the cortex; upon stimulation of skin receptors, their localization was in the parietal and precentral regions. Therefore, both methods of registration demonstrated that in the human, visceral sensation is presented more forward in the cortex than the somatic sensation. It was also found that visceral sensation is bound to a greater degree with nonspecific systems of the brain than with specific systems. In a study on rabbits (122), cats (48) and rats (22), by stimulation of the splanchnic and sciatic nerves, it was found that the degree of demarcation of the localization of visceral and somatic sensation differs in various species of animals. In various animals, the degree of the participation of specific and nonspecific systems of the brain in the perception of visceral functions may be different.

8812 EFFECT OF SALIVA ON GASTRIC EMPTYING. (E.) Malhotra, S. L. (Western Railway Med. Dept., Bombay). Amer. J. Physiol. 213(1): 169-173, 1967.

The effect of saliva on gastric emptying of fluid meals was studied by serial test meals using the dye-dilution technic; the experiments were so designed that the saliva was added to the meal in 1 set of observations and excluded from the other. The meals consisted of the South Indian appetizer called rasam, marked with a known quantity of phenol red (1 mg/100 ml); the pH of the meal was adjusted to 4.6. Results based upon 196 serial test meals showed that gastric emptying was significantly retarded when saliva was added to the meals than when it was not. This effect may have been due to some factor or factors in the saliva which retard gastric emptying. As an example, the action may be mediated through the action of salivary amylase in the meal producing sucrose, which in turn may inhibit the process of gastric emptying; or the mucus in the saliva may be precipitated on the gastric mucosa and in this state might be less permeable to stimuli responsible for gastric peristalsis, which are thus prevented from reaching the receptors, and in this manner may retard the gastric emptying rate.

8813 ENTEROGASTRONE INHIBITS EATING BY FASTED MICE. (E.) Schally, A. V. (Tulane U. Sch. Med., New Orleans, La.), T. W. Redding, H. W. Lucien and J. Meyer. Science 157(3785):210-211, 1967.

White Swiss female mice were fed a liquid diet consisting of 7.4% protein, 11.6% carbohydrate and 2.1% fat; they were then fasted for 17 hr., except that water was provided ad libitum to eliminate the effects of dehydration and thirst. The mice were then inj. i.v. or s.c. with test substances; controls were inj. with saline or carrier vehicle (which contained 16% gelatin and 0.5% phenol). Food was made available to the mic 10-15 min. later, and food consumption was measured after 30, 60, 120 and 240 min. A single inj. of enterogastrone (0.1-1.0 mg) purified from hog duodenum significantly reduced food-intake during the first 30-60 min.; there was no decrease in intake during later periods, but the cumulative changes remained evident after 4 hr. Two peptide preparations from hog duodenum (1 mg) had a slight effect when it was measured at 30 min., but the cumulative reduction was not observed between 1 and 4 hr. later; it is suggested that their minor effects may have been attributab to slight contamination with enterogastrone. Material purified from pig colonic mucosa (1 mg), as well as secretin (10 μg), glucagon (1 mg), bovine serum albumin (1 mg) and glucose (75 mg) had no effects. The anorexic agent chlorphentermine-HCl, admin. i.v. at 300 μg/mouse, significantly reduced intake during the first 30 min., and its cumulative effects were significant for as long as 2 hr. It is suggested that enterogastrone may be involved in inhibition of feeding it may act by inhibition of gastric contractions, and in part, humorally on the central nervous system.

8814 THE AMNIOGRAPH AS A METHOD OF STUDY OF GASTROINTESTINAL MOTILITY OF THE HUMAN FETUS in utero. ITS RELATION TO CHRONIC FETAL DISEASE. (Sp.) Karchmer K, S. (1st Gynec. Obstet. Hosp., Mexico City), A. Perdomo De La Sierra, V. S. Pinsker, A. D. Alonso and J. A. Aguilar Guerrero. Ginec. Obstet. Mex. 22(128):403-417, 1967.

8815 AN ELECTROPHYSIOLOGICAL STUDY OF SINGLE VAGAL EFFERENT UNITS ASSOCIATED WITH GASTRIC MOVEMENTS IN SHEEP. (E.) Iggo, A. (U. Edinburgh, Scotland) and B. F. Leek. J. Physiol. (London) 191(1):177-204, 1967.

8816 EVIDENCE THAT BLOCKADE OF ADRENERGIC RECEPTORS CAUSES OVERFLOW OF NOREPINEPHRINE IN CAT'S COLON AFTER NERVE STIMULATIO (E.) Boullin, D. J. (NIH, Bethesda, Md.), E. Costa and B. B. Brodie. J. Pharmacol. Exp. Ther. 157(1):125-134, 1967.

8817 THE LONGITUDINAL TISSUE RESISTANCE OF THE GUINEA-PIG TAENIA COLI. (E.) Jones, A. W. (U. Oxford, England) and T. Tomita. J. Physiol. (London) 191(2):109P-110P, 1967.

8818 CHANGES IN MOTILITY OF ISOLATED ILEUM OF CHAGASIC MOUSE. (Por.) Zanotto, A.

Sao Paulo, Brazil) and M. Okumura. Rev. Inst. Trop. S. Paulo 9(2):98-106, 1967.

HYOSCINE-ACETYLCHOLINE ANTAGONISM OF ISOLATED LONGITUDINAL MUSCLE OF GUINEA ILEUM DEPOLARIZED BY POTASSIUM. (Fr.) T. Rico, J. M. (Fac. Med., Lisbon). C. R. Biol. (Paris) 161(1):217-220, 1967.

MODE OF ACTION OF METHYLDIAZYL ON THE MOTOR ACTIVITY OF THE SMALL INTES- . (Rus.) Galperin, Iu. M. (Pathophysiol. , Moscow Area Res. Clin. Inst.), E. G. nevich and N. P. Kochetkova. Farmakol. ik. 29(6):695-698, 1966.

8821 ACTION OF SOME ANTIBIOTICS ON THE EXTRA-HEPATIC BILIARY TRACT. I. RIFAMYCIN SV. (E.) Benzi, G. (U. Pavia, Italy), A. Crema and G. M. Frigo. Arch. Int. Pharmacodyn. 167(2)·403-412, 1967.

8822 PERIODIC MOTOR ACTIVITY OF THE DIGESTIVE TRACT IN EXPERIMENTAL INTOXICATION WITH LEAD. (Rus.) Mambeeva, A. A. (Kazakh Reg. Inst. Path., USSR). Biull. Eksp. Biol. Med. 63(6):26-29, 1967.

8823 PROPERTIES OF THE POTASSIUM DEPOLARIZED RAT ILEUM. (E.) Hamburger, A. D. (Hebrew U., Jerusalem), S. Dikstein and F. G. Sulman. Arch. Int. Pharmacodyn. 167(2):250-259, 1967.

See also abstract nos.: 9021,9052,9070

8824 THE EFFECT OF ISOPRENALINE ON THE BILE SECRETION OF ANAESTHETIZED DOGS. (E.) Kasture, A. V. (Nagpur U., India) and A. K. Dorle. Curr. Sci. 36(7):178-179, 1967.

β-Isoproterenol was admin. i.v. to dogs with catheters of the bile duct in conc. of 0.01-10 μg/kg. Rate of bile secretion and conc. of bilirubin, bile acids, cholesterol and total solids were measured. β-Isoproterenol had a biphasic action on the vol. of secretion of bile, increasing it within the first 4 min., then decreasing it for 4-6 min.; for the 4 conc. of β-isoproterenol used, the increases were, resp., 27.2, 46.8, 81.2, and 163.5% and the decreases were, barely perceptible, 15.8, 34.4, and 63.3%. Analysis of the bile following i.v. inj. of 10 mg/kg showed increased bile acids (3.07 g/100 ml, normal 2.37 g/100 ml) and total solids (5.6 g/100 ml, normal 3.97 g/100 ml) and decreased cholesterol (41.9 mg/100 ml, normal 83.9 mg/100 ml), 4-6 min. after inj. The conc. of bilirubin was not significantly affected. The increase in bile acids with the concomitant decrease of cholesterol may have resulted from increased biosynthesis of bile acids from cholesterol in the liver.

8825 ACTION OF HYPOTHERMIA ON LIVER FUNCTION. (Fr.) Vanlerenberghe, J. (Fac. Med., Lille, France), N. Trupin-Bar, R. Guislain and C. Bel. J. Physiol. (Paris) 59(2):111-138, 1967.

The effect of lowered temperature on the vol. and conc. of constituents of bile was studied in white rats under anesthesia (normal temperature, 30°C and/or 25°C) with acute biliary fistula, or using the isolated perfused liver at temperatures, 40°, 30°, 25°, 20°, 15°, and 10° C or at some some of these decreased temperatures. The perfusion apparatus had a reservoir of the constant level type, 20 cm above the hepatic vein draining the excised liver, assuring constant pressure and rate of flow. Inflow was by way of the portal vein; temperature was closely maintained; the perfusate passed through a liquid film oxygenator supplied with pure, humidified O_2; the perfusate was part blood and part balanced physiological salt soln. The vol. of bile was measured directly in a graduated tube at 30-min. intervals. Total solids were determined after dessication. Bilirubin was assayed by spectrophotometry; Na and K by flame photometry; Cl by colorimetry; reducing sugars by 2 methods; bile salts were determined colorimetrically after separation by electrophoresis; BSP was determined photometrically as was D-xylose; radioactive iodine was measured by a scintillation counter. The changes in conc. were negligible for these substances during periods of hypothermia both in the whole animal and in the isolated perfused liver; the output of these substances followed changes in the liquid component. Hypothermia, like cyanide, did not upset the concentrating function of the hepatic parenchyma. These results are unlike those obtained with monoiodoacetic acid and phlorhizin. The Van't Hoff temperature coefficients remained between 2 and 3 for the temperature range 40°-10°C. The vol. reductions of bile with decrease temperature were about 50% at 30°C, 72% at 25°C, 89% at 20°C, 92% at 15°C and 95% at 10°C as compared to the vol. at 38°C.

8826 INDEPENDENCE OF HYPERPLASTIC AND HYPERTROPHIC RESPONSES IN LIVER REGENERATION. (E.) Sigel, B. (Woman's Med. Co Philadelphia, Pa.), L. B. Baldia, H. Menduke and Feigl. Surg. Gynec. Obstet. 125(1):95-100, 196

In dogs, partial hepatectomy and Eck fistula eac produced a cellular response in small, heterotopically-placed liver autografts; the graft effects of both of these procedures were differe Partial hepatectomy induced both hyperplasia and hypertrophy in the grafts. Eck fistula led main to hypertrophy without a concomitant hyperplasia Since both graft effects were probably mediated through a constitutent change in the blood, humo mechanisms were thought to be responsible for each effect. Hyperplasia and hypertrophy have been known to occur independently in the nontran planted liver. In the present experiments, it was shown that hypertrophy can be induced in grafts without hyperplasia. Thus, it was concl that 2 different humoral mechanisms were evoked after partial hepatectomy and Eck fistula, and that these were independent of each other. This deduction indicates that possibly different hepatic injuries lead to specific liver cell responses through humoral means. The regulation of liver regeneration may be by a series of humoral mechanisms which may, in the final analysis, represent the composite and expression of many biochemical feedback reactions.

8827 THE PREPARATION OF METABOLICALLY ACTI SUSPENSIONS OF MOUSE LIVER CELLS. (E Gardner, D. A. (U. Rochester Sch. Med., N. Y.) and E. R. M. Kay. Experientia 23(7):596-597, 1967.

A simple and rapid (35 min.) method for the isolation of free mouse-liver cells is describe this method minimizes the physical treatment to suspended cells once they are freed from the tissue. An adult CFW mouse is placed under ether anesthesia and the liver is perfused, in situ, through the portal vein with 15-20 ml of Ca-free Locke's soln. at room temperature at pH 7.3; perfusion is done slowly (1.5-2.0 min. to completion). Immediately after perfusion, the liver is excised and rinsed twice in Ca-free Locke's soln. at room temperature. To insure a sufficient number of cells for metabolic studie a second mouse liver is prepared in the same wa The combined livers are rapidly weighed and the cut into pieces of approx. 3 mm^3 size. The tis then dispersed very gently by pressing it with Teflon pestle through a sac made of hard finish cron mesh into a Thomas grinding vessel, size containing only 30 ml of Ca-free Locke's soln. room temperature. While the tissue is pressed ntly, the individual cells disperse into the lk of the suspension medium, thus avoiding any ditional contact between free cells and the stle. When most of the tissue (approx. 85%) s been dispersed, the suspension is filtered rough a filter of fine mesh rayon (80 threads/in. 84 threads/in.) to remove large clumps of lls; the suspended cells are gently sedimented centrifugation at 50 g for 4 min. at 4°C. e supernatant is removed by suction and the dimented cells are carefully resuspended in ml of Ca-free Locke's soln. using a pipette th an orifice of 0.09 mm, or larger. The cells e sedimented again for 3.5 min. at 50 g; after moval of the supernatant by suction, the cells e resuspended in 15 ml of Ca-free Locke's soln. was found that this method consistently gave yield of from 40-50% of the original tissue ss recovered as intact free cells. Two mouse ver cells dispersed in this manner yield 8-2.2 ml of packed cells which have a dry . of 160-200 mg; the number of cells in the spension was found repeatedly to be 35 x 10^6 ± % of cells/g of dispersed liver. It was found at the free cells maintained at 25°C in the sence of additional substrates (other than e 5.5 x 10^{-3} M glucose present in Ca-free cke's soln.) exhibited a slowly decreasing pacity to respire.

28 LIVER LIPOSOMES. I. ISOLATION AND CHEMICAL CHARACTERIZATION. (E.) hlunk, F. F. (U. Pittsburgh Sch. Med., Pa.) d B. Lombardi. Lab. Invest. 17(1):30-38, 1967.

ite female (Wistar strain) rats were given DL-hionine (as a 2.5% soln. in saline at a dosage l mg/g) by stomach tube in 2 equally divided ses at zero time and after 2 hr.; equal vol. of line were admin. similarly to controls. Hepatic posomes were isolated and purified by a method scribed in detail, after sacrifice and removal the rat livers. Liposomes (revealed by electron croscopic studies) are structures constituted osmiophilic centers enclosed by membranes, in e endoplasmic reticulum of liver and other cells gaged in active esterification of fatty acids. posomes isolated from livers of ethionine-eated rats appeared as spherical bodies ranging diameter from 1500-2500 Å; they were limited membranes and had contents of an electron nsity somewhat less than that of liposomes situ. The membranes were sometimes studded th ribosomes, but most often appeared to be ee of ribonucleoprotein. Chemical analyses of e contents of isolated liposomes showed them consist mainly of neutral lipids, chiefly iglycerides. The conc. of protein, phospholipid d RNA was highest in preparations of microsomes d liposome membranes, slightly lower in lipo-mes and least in preparations of liposome con-nts. The conc. of free cholesterol was con-derably higher than that of cholesterol esters all fractions, except liposome contents. The phospholipid and RNA contents of liposomes and microsomes from ethionine-treated and control rats, and of liposome membranes from ethionine-treated rats were very similar; phospholipid and RNA in preparations of liposome contents were quite low. The amount of triglycerides in the microsomal preparations from ethionine-treated and control animals and in the liposome membrane preparations from ethionine-treated rats was very low and quite similar. The triglyceride content was quite large in liposomes, especially in those obtained from livers of ethionine-treated rats, and in preparations of liposome contents which contained more than 3-times as much triglyceride as the liposomes obtained from the corresponding livers. Data supporting the view that liposome membranes derive from those of the endoplasmic reticulum are also presented, and the possible physiopathologic significance of liposomes is discussed.

8829 INFLUENCE OF ISOBARIC AND HYPERBARIC OXYGEN ON BILIARY PO_2 AND THE MECHANICS OF BILE FLOW. (E.) Kelly, K. A. (U. Amsterdam) and P. J. Klopper. Amer. J. Physiol. 212(5): 1017-1024, 1967.

Arterial, inferior vena caval, portal venous, and biliary PO_2 values were determined in rabbits breathing air, isobaric O_2, and hyperbaric O_2. Rate of bile flow, rate of rise of bile secreted into a vertical catheter, and max. biliary secretion pressure were also measured. When breathing isobaric air, the PO_2 in bile was always greater than that in the portal venous blood and was closer to the PO_2 in the arterial blood. Biliary PO_2 markedly increased when iso- and hyperbaric O_2 were admin., as did arterial but not portal venous PO_2. Bile flow, rate of rise of bile in a vertical catheter, and max. biliary secretion pressure were not significantly altered during the varied experimental conditions. An intimate contact between hepatic arterial blood and bile is suggested by the data.

8830 EFFECT OF ADMINISTRATION OF 3-AMINOTRIAZOLE ON THE ACTIVITY OF MICROSOMAL DRUG-METABOLIZING ENZYME SYSTEMS OF RAT LIVER. (E.) Kato, R. (Nat. Inst. Hyg. Sci., Tokyo). Jap. J. Pharmacol. 17(1):56-63, 1967.

Inj. of 3-aminotriazole (i.p. at 125-2000 mg/kg) to male rats markedly decreased the hexobarbital hydroxylation, aminopyrine N-demethylation, aniline hydroxylation and the p-nitrobenzoic acid nitro-reduction in the liver microsomes. Moreover, the content of P-450 (a microsomal CO-binding hemoprotein) was also decreased but the liver microsome content of cytochrome b_5 was not decreased. Furthermore, the admin. of 3-aminotriazole (500 mg/i.p.) significantly prevented the increase in the hexobarbital hydroxylation, aminopyrine N-demethylation and the p-nitrobenzoic acid nitro-reduction induced by the admin. of phenobarbital and methylcholanthrene. Studies showed that the admin. of 2000 mg/kg i.p. of 3-aminotriazole decreased the rate of pentobarbital metabolism in vivo by 37%. Addition of 3-aminotriazole only slightly inhibited the activity of the microsomal enzymes and the preincubation of the microsomes containing supernatant with 3-aminotriazole did not increase the inhibitory action of 3-aminotriazole. The results suggest that the decrease in the activities of drug-metaboling enzymes may be reflected by the change in the content of P-450, probably through the inhibition of biosynthesis of the P-450 moiety.

8831 PATHOPHYSIOLOGICAL STUDIES ON IRON METABOLISM. ACTIVITY OF IRON-FLAVIN ENZYMES AND CONTENTS OF IRON AND RIBOFLAVIN IN REGENERATING LIVER. (Jap.) Nakamura, S. (Kyushu U., Fukuoka, Japan). Igaku Kenkyu (Acta Med. [Fukuoka]) 36(2):219-238, 1966.

Three main groups of rats were studied: (1) animals maintained on a normal diet, (2) animals on a diet deficient in Fe, and (3) rats on a diet deficient in riboflavin. Each group was divided into an unoperated subgroup and a subgroup 40% hepatectomized. At 48 and 72 hr. after operation on the animals with normal diet and at 48 hr. in the deficient groups, the activities of succinic dehydrogenase, reduced diphosphopyridine nucleotide diaphorase (DPNH diaphorase), and xanthine oxidase were determined in regenerating liver tissue as well as in liver tissue from unoperated animals maintained on the normal and the deficient diets. Some tissue (equal wt.) from each subgroup was homogenized in 0.25 M sucrose and differentially centrifuged in a number of stages into mitochondrial and microsomal fractions and a final supernatant vol.; these 3 portions were then quantitatively tested for the activity of the 3 enzymes. The activity of succinic dehydrogenase was decreased in the unoperated livers of animals both in the Fe-deficient and riboflavin-deficient groups; following partial resection, the animals on a normal diet showed decreased succinic dehydrogenase activity at 48 hr. and slightly increased activity at 72 hr.; activity of the Fe-deficient group was increased at 48 hr. and activity of the riboflavin-deficient group was decreased. No difference was noted in activity of DPNH-diaphorase in mitochondria and in microsomes of unoperated normal diet and Fe-deficient groups; a slight decrease of DPNH-diaphorase activity was detected in the microsomes of the unoperated riboflavin-deficient group. The DPNH-diaphorase activity in mitochondria of regenerating liver (normal diet) was always more than normal at 48 hr. and increased at 72 hr., while that in the microsomes was doubled at 48 hr. and increased further at 72 hr. Xanthine oxidase activity was slightly decreased in the unoperated Fe-deficient liver and markedly depressed in the unoperated riboflavin-deficient organ; in regenerating liver, xanthine oxidase activity was greatly increased both in control (48 and 72 hr.) and in the deficient groups, although lower than in the control animals. In regenerating liver the content of non-hemin Fe was increased in the control rats and even in the Fe-deficient rat; the riboflavin content was elevated in the control group and even in the riboflavin-deficient group.

8832 HEPATIC DIURNAL CYCLE. (Fr.) Suppan P. (U. Lausanne, Switzerland). Acta Anat. (Basal) 65(4):584-593, 1967.

White male rats (200-300 g) were maintained on standard diet in a constant environment: 22°C and 55% humidity with daylight the only illumin tion. Four series of 24 animals each were used 1 series in each season of the yr. In each ser 2 rats were killed by decapitation every 2 hr.; pieces of the right lobe of the liver were prepared for histologic examination. For karyomet examination 500 nuclei were drawn 2300 times an then measured by planimetry. The size of nucle reached a max. in each 2-hr. cycle over a perio of 24 hr. During the daytime the nuclei were generally larger and their variability greater than during the night. These changes in size were statistically significant in 7 of 12 diurn periods of 2 hr. each. The daily changes were v similar during the 4 seasons of the yr. In the course of the daily cycle binuclear cells reach a peak at 10 PM and giant nuclei were max. at 6

8833 RELEASE OF LIPOPROTEIN LIPASE FROM TH PERFUSED LIVER OF THE RAT. (E.) Fel J. M. (Roy. Vet. Coll., London) and P. A. Mayes Nature (London) 214(5088):620-621, 1967.

Livers from 4 male rats were perfused with 100 whole, defibrinated rat blood. In 2 (Group 1), increasing conc. of heparin (0, 0.4, 4.0, 40, 200 I.U./mg), NaCl, and protamine sulfate were made to replicate incubations so that their con were 0.4 I.U./ml, 0.6 M and 0.3 mg/ml, resp. Lipase activity of perfusate increased significantly with time in Group 1, but not in Group 2 Addition of heparin to the assay system significantly stimulated lipase activity in serum from Group 2, but not from Group 1, where hepar had already activated lipoprotein lipase. Addi tion of NaCl to the assay system caused a significant inhibition of lipase activity in Group 1 (30, 45, 60 min.) and also when added to the heparin-activated Group 2. Addition of protami sulfate caused only a slight, but significant, inhibition of lipase activity when added to ser from Group 1 (30, 45, 60 min.), since the serum at those time intervals contained much heparin. Protamine sulfate also significantly inhibited lipase activity when added to the heparin-activ serum of Group 2. In a separate experiment, in creasing conc. of heparin were added to whole, defibrinated rat blood while circulating in the perfusion apparatus, but with no liver in the c cuit; it was shown that the liver was the sourc of the additional lipoprotein lipase found in t perfusate in Group 1. Addition of a large amou of heparin caused the liver to release a lipoly enzyme into the circulation, but this does not mean that lipoprotein lipase is functional in t liver. The results support the authors' previously expressed theory that the results of others on the metabolism of chylomicrons or triglycerides in the perfused liver, in which substantial rates of uptake and oxidation were fou were the consequence of the activation of lipoprotein by heparin.

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See also abstract no.: 8710

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ighly-dispersed suspension of $BaSO_4$ was ob-
ned by ultrasonic means. The optimal condi-
ns of sound treatment are use of a magneto-
ictive radiator at a frequency of 20 kilohertz,
ensity of approx. 3-5 watt/cm^2 and a 20-min.
osure at 20°-25°; the presence of a stabilizer
latin in a ratio of 1:100 dry wt.) is essential.
ked diminution of the viscosity of the sus-
sion, which was obtained in the acoustic field
the presence of gelatin, allows a conc. of
O_4 of up to 70%; this significantly increases
contrast characteristics of the mass. After
nd treatment, all of the particles of $BaSO_4$
1µ or less in size. The suspension obtained
ffers by a high stability; marked precipitation
the particles began after 8-10 hr. The rela-
ely low viscosity (at conc. of 50-60%), the
h amount of dispersion and contrast of the
pension improves the mucosal picture during
ay examination of the gastrointestinal tract,
significantly improves diagnosis.

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(CLINICAL AND EXPERIMENTAL STUDIES).
r.) Marella, M. S. (Fac. Med., Montevideo)
A. Del Campo. *Zbl. Chir.* 92(18):633-636, 1967.

experimental series of operations (end-to-end
stomosis of the large intestine) in 39 dogs
undertaken to study and improve the suturing
the intestinal wall. Resections with end-to-
anastomoses (44), 29 resections of the colon
15 of the ileum and jejunum were done in man
ng these technics. Specific points stressed
the experimental series were: 1) Clamping of
intestine was avoided. 2) Atraumatic needles
nonabsorbable suture thread were used. 3)
eeding was carefully stopped by ligatures while
blood flow to the intestine was unimpeded.
The suturing of the far wall followed with tied
tures (2-3 mm apart in the dog, 3-4 mm in man)
luding the serosa, muscularis, and submucosa,
not the mucosa; the suture threads were tied
the intestinal lumen. 5) The suturing of the
r wall then proceeded in a similar manner.
rty dogs had single-layered and 9 double-
yered sutures. Linen or silk thread coated
th petroleum jelly were the materials used; nylon
ofilament was tried, but its lesser flexibility
de it difficult to tie triple knots, increasing
danger of ripping the wall; the formation
adhesions was also greater when nylon was
ed. Comparing the results of single-layered
double-layered sutures, the suture insuf-
ciency was the same; actually these insuf-
ciencies occurred during the first few cases
ly so that they may have been operational.
e single-layered sutures restored the continuity
of the intestine. These technics were followed in the 44 human resections. The end-to-end anastomoses using the single-layered sutures resulted in a lumen of larger diameter, and a suture roll thinner than in multilayered methods. Advantages of the single-layered sutures are: 1) The disruption of the blood supply is minimal; 2) No dead spaces are formed as in multilayers to collect exudate, become infected, and finally cause fistulas and stenosis; 3) The strength of the suture is dependent upon the individual technic, and the state of the surrounding tissue; the strength of the single-layered sutures themselves is more than adequate.

8903 RESULTS OF INVESTIGATIONS ON INTESTINAL BACTERIA IN THE FOOD INDUSTRY (WITH CONSIDERATION OF THE NEED FOR URINE EXAMINATIONS). (Ger.) Gärtner, H. (U. Kiel, Germany) and I. Böhlck. *Oeff. Gesundheitswesen* 29(5-6):266-271, 1967.

During the period 1962-1966 inclusive, 244,861 stool examinations were made of healthy persons engaged in the food industry in Schleswig-Holstein, ranging from 45,000 to 52,000/yr. with an av. of nearly 49,000/yr. Among these a total of 104 or 0.042% were positive for undesirable bacterial forms. Of these 27 had *Salmonella typhi*, and 25 *S. paratyphi* B; 50 had other lesser forms of *Salmonella* and 2 were carriers of *Shigella sonnei*. Repeated examinations of carriers showed that 35 of 88 investigated in the years 1963-1966 were long-term harborers. One carrier of *S. paratyphi* B was positive 19 times in stool and 11 times in urine examinations; following cholecystectomy and a course of penicillin therapy 11 stool and 17 urine examinations over a period of 1.5 yr. proved to be negative. In all cases none of these bacteria were found in the urine unless they were also present in the feces. The urinary examination may aid in discovering cases of long standing where a previous history is unknown.

8904 BIOCHEMICAL DIFFERENTIATION OF ENTEROBACTERIA IN THE CLINICAL BACTERIOLOGICAL LABORATORY. (Fr.) Renoux, G. (St. Eloi Clin., Montpellier, France) and E. Despaux. *Path. Biol. (Paris)* 15(7-8):432-435, 1967.

A simplified method for the biochemical differentiation of *Enterobacteriaceae* is described which can be applied in the normal clinical laboratory, and which the authors have been using for the past 3 yr. (in addition to the lysine-decarboxylase test). The method is based on urease detection, acidification of glucose and lactose, and β-galactosidase detection, with identification according to a dichotomy scheme devised by the authors. The culture media and reagents used include urea-indole, Kligler's lactose-glucose

H_2S medium, Kovacs' reagent, orthonitrophenyl-β-D-galactopyranoside, mobilized mannitol, Simmons', Clark and Lubs', Loeffler's, Kohn's, Christensen's and others. The following conclusions were drawn from the author's experience: Gram-negative bacteria which alkalize or fail to alter Kliger's medium are not Enterobacteria; Pseudomonas can be differentiated from Enterobacteria by the oxidase test; Aeromonas can be distinguished from β-galactosidase-positive Enterobacteria by the oxidase test; Aerobacter aerogenes differs from Aerobacter cloacae by its action on gelatin, glycerine, and inositol; β-galactosidase-negative Citrobacter can be distinguished from Salmonella by the lysine decarboxylase and KCN tests; Serratia differs from Enterobacteria inasmuch as they are gelatin-positive and fail to ferment arabinose; Providencia (Proteus) are correctly identified by the tryptophan-deaminase and urea-indole tests; Alkalescens and Dispar are usually citrate (Christensen)-positive; correct identification of Shigella and Salmonella is usually completed by serological tests.

8905 THE METHOD OF CONTRAST PERITONEOGRAPHY. (Rus.) Malkin, B. M. (Moscow Region. Res. Clin. Inst.). Vestn. Rentgen. Radiol. 42(1): 41-48, 1967.

A study was made on 22 rabbits and 8 dogs with 50% and 70% soln. of iodopyracet (Diodone) as the contrast preparation. In Series 1 (12 rabbits, 4 dogs), it was found that contrast peritoneography with iodopyracet (2-15 ml inj. intra-abdominally) enabled the detection of small amounts of fluids and their locations in the abdominal cavity. In Series 2 (8 rabbits), contrast peritoneography (iodopyracet was inj. under visual X-ray control into the area to be studied) facilitated the development of X-rays with a clear picture of individual organs of the abdominal cavity; e.g., liver, stomach, spleen, intestinal loops, bladder, etc. In Series 3 (10 rabbits, 2 dogs) it was found that admin. of water-soluble contrast preparations (in particular, 50%-70% iodopyracet) into the abdominal cavity produced no evident morphologic changes in the animal during an observation period of from 30 min.-8 mo. after admin. of the contrast medium. In Series 4 (4 dogs with Thiry-Vella intestinal fistulas), there was an inhibitory effect of iodopyracet on intestinal motility, i.e., after intra-abdominal admin. of iodopyracet there was inhibition of motor activity of the small intestine of up to 2 hr. duration; some of the animals were restless and in some there was a brief increase in respiratory frequency. The addition of 0.5% novocaine soln. to the contrast medium prevented the inhibition of motor activity of the small intestine, or the latter was brief (5-10 min.) with subsequent restoration of its normal amplitude of contraction; frequently, the contractions were stimulated. Thus, the method of contrast peritoneography could be effectively used for early recognition of closed injuries and acute inflammations of the abdominal cavity, particularly peritonitis.

8906 A COMPARISON OF TWO ANTIBIOTIC REGIM
IN THE TREATMENT OF GASTROENTERITIS
MALNOURISHED CHILDREN WITH A ONE-YEAR FOLLOW-U
OF THEIR SUBSEQUENT PROGRESS. (E.) Wittmann,
(U. Cape Town, South Africa), A. D. Moodie and
J. D. L. Hansen. S. Afr. Med. J. 41(16):414-4
1967.

A study was made on 101 children (62% males;
2 mo.-2 yr.) with clinically detectable dehydr
tion associated with diarrhea and vomiting. F
and electrolytes (M/6 sodium lactate, 5 ml/pou
the remainder as half-strength Darrow's soln.
2.5 dextrose; all over 24 hr.) were replaced b
scalp vein infusion. They received no milk du
the first 24 hr. and were then fed reconstitut
dried skimmed milk (2.5 ounces/pound) or were
breast fed. Drug therapy consisted of 1 of 2
regimens: 1) 1 i.m. inj. Benzathine penicilli
(300,000 U) + sulfadiazine suspension admin. p
for 5 days in a total dosage of 90-120 mg/pour
in 4 divided doses/day; 2) chloramphenicol pal
mitate p.o. for 5 days in a total dosage of
40 mg/pound/day in 4 divided doses/day; all fo
2 wk. Results of therapy were based on mother
reports of duration of diarrhea. Therapy was
considered successful if diarrhea stopped in t
first wk. and did not recur in the second. Pa
tients were classified as: less than 60% (10
60-75% (35), more than 75% (53) of expected wt
Failures to respond were 90%, 58%, and 30%, re
They were also classified into low, normal an
low plus normal wt. groups. Failures for the
groups were: 41%, 18%, 33% in Regimen 1; 69%
45%, 31% in Regimen 2. Results in favor of
Regimen 1 were statistically significant. Ni
died in the 2 wk. All 7 treated by Regimen 2
died, died within 1 wk., 5 with symptoms of g
malnourishment, while the 2 in Regimen 1 were
reasonably well nourished. Further follow-up
was made on 85 (9 deaths, 7 losses to follow-
Of 64 low and 37 normal wt., 51 and 29, resp.
continued through the study. Results in foll
were: mortality (9% low, 0% normal); kwashio
(18%, 7%); recurrent severe diarrhea (63%, 38
recurrent mild diarrhea (11%, 46%); no diarrh
(18%, 28%); wt. loss (59%, 14%), normal wt. a
1 yr. (29%, 86%), prolonged hospital treatmen
(13%, 7%). In the first wk. 90% of the death
occurred; rate for the whole yr. was 14%. On
3 of 14 who died were normal in wt. There wa
no difference in incidence of infection betwe
those who died and the others.

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A COMPARATIVE ELECTROCARDIOGRAPHIC
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1967.

8908 CHRONIC INTESTINAL AMEBIASIS. TREA
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C. A. (Guemes Inst. Surg., Buenos Aires). Pr
Med. Argent. 53(24):1336-1338, 1966.

9 A COMPARISON OF ORAL AND PARENTERAL ACTIVITY OF HYCANTHONE AND LUCANTHONE XPERIMENTAL INFECTIONS WITH Schistosoma soni. (E.) Berberian, D. A. (Sterling-Winthrop Inst., Rensselaer, N. Y.), H. Freele, D. Rosi, . Dennis and S. Archer. Amer. J. Trop. Med.):487-491, 1967.

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See also abstract nos.: 9140,9148,9261,9292,9296,9297,9460,9667,9673

GASTROINTESTINAL DISEASES

GENERAL

47 DISABILITY FROM DISEASES OF THE DIGESTIVE
SYSTEM. (E.) (Ed.) Statistical Bull.
tropolitan Life Insurance Co. 48(April):10-12,
67.

special study of the Metropolitan Life Insurance
mpany employees covered by group insurance
owed that digestive diseases accounted for
% of the new cases lasting for more than a wk.
ring the period 1963-64; the percentage for
n was 17 and for women 10.4. The incidence of
l cases for men was 104.3/thousand and of all
ses for women 196/thousand; all diseases of
e digestive tract for men were 18.5/thousand
d for women 20.4/thousand. The incidence of
sability from digestive disorders rose rapidly
th advance in age, especially for the men.
tween the age groups 17-24 and 45-64 the
cidence more than triples for men and almost
ubles for women. In the oldest age group
cidence of disability due to digestive tract
almost the same for both sexes, about 28/thou-
nd. Some digestive disorders showed marked
fferentials in frequency by sex; hernias of
e abdominal cavity disabled males five times
re frequently than women, but diarrhea and
teritis occurred 3.5 times more often among
men; ulcers were somewhat more frequent among
n. Gastric and duodenal ulcers and hernias
the abdominal cavity accounted for more than
lf of all male disabilities due to digestive
sorders; disability from ulcers increased from
l/thousand at ages 17-24 to 7.3/thousand at
es 45-64; the rise due to abdominal hernias
s even steeper, 1.1 to 8.6/thousand. Disorders
the gallbladder, diverticulitis, and disorders
the anal and rectal region became important
uses of disability in the age group 45-64.
male employees were incapacitated more often
diarrhea and enteritis than by any other
sorders of the digestive system. At ages 45-64
cers, gallbladder diseases, diverticulitis and
seases of the buccal cavity and esophagus
came important causes of disability among women.
pendicitis was an important cause of disability
both sexes below the age of 25 yr. Claim
cords relating to disabilities from digestive
sorders point to associated emotional stress
re often than with most other causes of dis-
ility.

48 PROGRESSIVE CALCIFICATION OF THE DIGES-
TIVE TRACT ARTERIES, CLINICAL AND
TERIOGRAPHIC DATA IN 6 CASES. (Fr.) Debray,
(Bichat Hosp., Paris), J. Leymarios, J. P.
rdouin, M. Cerf, J. A. Paolaggi and C. Hernandez.
esse Med. 75(14):691-696, 1967.

e first patient had excruciating epigastric
in; no pulse could be detected in the legs;
epigastric murmur was present. Radiology of
e digestive tract was negative. Translumbar
rtography showed the following arterial
omalies: (1) Upper abdominal aorta of irregular caliber. (2) Aorta seemed to end at L-3-L-4. (3) No visible inferior mesenteric artery. (4) Superior mesenteric artery, a stump of 3mm. (4) Celiac trunk large (7 mm diameter). (5) Large left lumbar artery from aorta extending to limit of exposure. (6) Whole digestive tract supplied by hypertrophic celiac artery. (7) Lower left abdominal region supplied by a lumbar artery. Patient was operated upon despite poor arterial condition. Total obliteration of the superior and inferior mesenteric arterial lumens had occurred at their origin. The superior mesenteric reduced to a fibrous cord was patched with vein; no pulse was recovered in these arteries. The patient died; autopsy showed massive infarct of the intestine. The second subject admitted for gastric ulcer had an abdominal murmur, latent peripheral arthritis and a complete ostial obliteration of the celiac trunk and the superior mesenteric. The digestive tract and its associated glands were entirely supplied by the inferior mesenteric artery aided by a complex collateral circulation, most conspicuously a greatly enlarged arcade of Riolan. The third case suffered from pain suggesting ischemia of the digestive tract. Aortography showed stenosis of the celiac trunk without any interference with the superior mesenteric. Upon operation a felt-like impeding growth surrounding the celiac trunk was removed; in the weeks following operation the pain was much reduced. The fourth patient suffered from localized abdominal pain. The hepatic artery proved to be stenosed and surrounded by a felt-like growth. After corrective surgery, the patient had no pain and follow-up arteriography revealed a normal hepatic circulation. The fifth and sixth cases showed obliteration of the ostium of the celiac trunk with enlargement of the superior mesenteric as the chief compensating artery. Such arterial obstruction and obliteration incurs the development of extensive collateral circulation appearing as dilated and convoluted, pathologically-anastomosing arteries. Such arteries are of major practical significance: cutting or ligating them accidently during surgery can produce acute ischemia and gangrene of the intestine.

8949 ALLERGIC GASTROENTEROPATHY. A CAUSE OF EXCESSIVE GASTROINTESTINAL PROTEIN LOSS. (E.) Waldmann, T. A. (NIH, Bethesda, Md.) R. D. Wochner, L. Laster and R. S. Gordon, Jr. New Eng. J. Med. 276(14):761-769, 1967.

Six patients (4 males, 2 females; 2.4 mo.-14 yr. old) with a syndrome of edema, anemia, hypoalbuminemia, hypogammaglobulinemia, eosinophilia and growth retardation are described. Each patient had a normal or increased rate of albumin synthesis; each had a markedly shortened albumin survival half-time of 2.8-3.9 days, as compared to 17 ± 3 days in 14 controls. Fecal excretion of ^{131}I-labeled polyvinylpyrrolidone and ^{51}Cr-labeled albumin after i.v. admin. of these macromolecules was increased markedly; this indicated that gastrointestinal protein loss was responsible for the short survival of albumin, and the consequent hypoproteinemia. Such currently known causes of protein-losing gastroenteropathy as intestinal lymphangiectasia, celiac disease and agammaglobulinemia were excluded as underlying factors in this syndrome. Several factors suggested that gastrointestinal allergy may have been the cause of the protein-losing gastroenteropathy. There was a significant amelioration of clinical symptoms and disorders of protein metabolism in 3 patients studied on an elimination diet (specifically on a milk-free diet). When milk was reintroduced into the diet, diarrhea and vomiting, increased eosinophilia and an increase in the number of Charcot-Leyden crystals in stools developed, and the protein-losing gastroenteropathy worsened. Other features suggestive of an underlying allergic process included extreme eosinophilia in 4, presence of Charcot-Leyden crystals in the stools of 4, presence of precipitating antibodies to milk in the serum of 3, a family history of allergic disorders in 4 of the 5 infants in the series, and clinical manifestations of allergy such as persistent rhinitis, eczema and asthma in 4. In addition, there was a favorable response to admin. of corticosteroids (prednisone). The term "allergic gastroenteropathy" is suggested for this syndrome.

8950 HEMODYNAMIC AND METABOLIC CHANGES ASSOCIATED WITH BACTERIAL PERITONITIS. (E.) Rosoff, L. (U. Southern California Sch. Med., Los Angeles), M. Weil, E. C. Bradley and C. J. Berne. Amer. J. Surg. 114(2):180-189, 1967.

Hemodynamic and metabolic studies were performed on 10 patients critically ill with diffuse bacterial peritonitis, without concurrent diseases or lesions which could be productive of shock, such as hemorrhage, pancreatitis, myocardial infarction or major trauma; in 9 patients the bacterial peritonitis was enterogenous and in 1 hemorrhagic necrosis and i.p. rupture of a large degenerating myoma of the uterus was the initiating cause. Eight of the 10 patients died. Cardiac output and velocity of blood flow were normal. Total peripheral arterial resistance was markedly reduced in patients in whom systolic blood pressure was reduced to 75 mm Hg or less, despite normal cardiac output. Blood lactate levels were greatly elevated in these patients, indicating a critical reduction in blood flow necessary to sustain normal metabolism of vital tissues. There was an elevation of SGOT levels, which was evidence of cellular injury resulting from inadequate tissue perfusion or due to the primary lesion. These results indicate that an abnormal variation in distribution of blood flow is an outstanding circulatory alteration in patients with diffuse bacterial peritonitis; this hemodynamic effect may be explained by arteriovenous shunting in the systemic vascular bed. The site of such shunting is unidentified, but presumably occurs in the area of peritoneal inflammation. Decreases in alveolar O_2 exchange also indicate the coexistence of arteriovenous shunting in the pulmonary circula-
tion. Ventilatory failure and profound alterat
in pulmonary function appear to be significant
factors in the lethality of diffuse bacterial
peritonitis.

8951 VARIABILITY OF GASTRIC SECRETION IN
PATIENTS WITH AND WITHOUT THE ZOLLIN
ELLISON SYNDROME. (E.) Winship, D. H. (Marqu
U. Sch. Med., Milwaukee, Wis.) and E. H. Ellis
Lancet 1(7500):1128-1130, 1967.

Repeated histamine stimulation tests and measu
ment of 12-hr. (overnight) basal acid output
were made in 8 patients (a 14-yr.-old boy and
3 men, 4 women, aged 26-68) with severe, recur
peptic ulcers, prior to surgery. Operation
confirmed Zollinger-Ellison Syndrome in 4 of 8
although all were suspected of having this
syndrome. Preoperative testing (with at least
2 days between any 2 tests) in 7 patients show
striking variations in secretory patterns,
especially in basal acid secretion. Among the
patients with the surgically confirmed syndrom
preoperative studies, as above, were negative
in 1 of 4, and emergency surgery required in
another precluded repetition of histamine stim
tion. All of the 4 without surgically confirm
syndrome showed striking degrees of gastric
hypersecretion, with at least 1 element of the
secretory pattern suggesting the diagnosis in
each. The variations seen, especially in term
of basal acid secretion, were similar to the 4
without surgical confirmation of the syndrome.
Of this unconfirmed group of 4, 1 showed a lar
gastric ulcer, and the other showed active
duodenal ulcer craters.

8952 ACUTE SURGICAL ABDOMEN IN PATIENTS
WITH BURNS. (Bul.) Ranev, D., A.
Atanasov and N. Angelov. Khirurgiia (Sofia)
19(5):451-455, 1966.

Of 1400 patients treated for burns, 67 had var
forms of acute surgical abdomen (gastrointesti
tract hemorrhage, 15; gastric and duodenal ulc
perforation, 2; acute gastric dilatation, 37;
acute pancreatitis, 1; acute cholecystitis, 1;
other diseases, 11). Acute surgical abdomen i
a serious complication which develops from a
severe general condition and creates difficult
in diagnosis and treatment. Hemorrhages of th
gastrointestinal tract are accompanied by gast
and intestinal necrosis and acute gastric dila
tion. Diagnosis, clinical course and treatmen
these different forms of acute surgical abdome
are discussed, and case histories of 6 patient
(all male; 3-36 yr. old) with burns are given
detail. Hemorrhages of the gastrointestinal t
were separated into 2 groups. Group 1, dystro
changes in the stomach and intestine occurring
during the period of shock and the first days
toxic infection, were treated by conservative
therapy followed by surgery; and Group 2, gene
capillary toxicosis, found during the period o
toxic infection, were treated with cortisones,
antihistamines, etc. Acute gastric dilatation
developed at the termination of shock and duri

xic infection; these are treated by gastric nsing, blood transfusions, electrolyte soln., tamins, cardiac drugs, etc.

53 CHARACTERISTICS OF ACIDOSIS IN INFECTIOUS DIARRHEA OF THE NEWBORN. (Ger.) Kerpel- onius, E. (U. Budapest, Hungary) and G. Gyódi. Kinderheilk. 99(4):338-346, 1967.

e role of acidosis as well as of a number of her factors in the high mortality of premature fants was studied in 42 such infants from 3-42 ys old with birth wt. of 1100-2100 g. Infection Escherichia coli was a contributing entity. ood was obtained by arterial puncture. pH, O_2, excess base, and standard bicarbonate were termined. The pH of the blood of 13 was less an 7, of 9 between 7.01 and 7.15, and of 15 tween 7.16-7.30. Of the 13, 7 died; of the 9, died; and of the 15, 2 died. This clearly owed the relationship between early mortality d acidosis. The premature acidotic upon autopsy d anatomical changes, brain hemorrhage, intestinal rforation and bronchopneumonia; 2 infants lived r 12 days and 20 days despite severe acidosis die from infection. E. coli was found in all ternal organs investigated in 1 and the other ed decompensated in a hypoglycemic episode. The idosis at times developed with extreme rapidity; usually large amounts of bicarbonate were quired to correct the acidosis of metabolic igin and only in part compensated by respiration. e acidosis was much more persistent in the emature than in older infants. Thus the rtality among the premature seemed to be sociated with acidosis arising from faulty tabolism, leading to, or linked with, infection the infants with consequent septicemia and equent marasmus, sometimes complicated by ontaneous hypoglycemia.

54 ABSORPTION OF CHOLERA TOXIN INTO BLOOD FROM A SEPARATED JEJUNAL SEGMENT. (E.) ughan Williams, E. M. (Haffkine Inst., Bombay) d A. N. Dohadwalla. Nature (London) 215(5100): 2-553, 1967.

fant rabbits were equipped with a separated gment of jejunum, with 1 end blind and the other ening to the exterior as a fistula (Thiry loop), d the continuity of the remainder of the gastro- testinal tract was restored by anastomosis. In animals, rabbit passaged Vibrio cholerae Inaba 9B organisms were introduced into the separated gments at operation, or 24 or 48 hr. later. control animals, 0.2 ml of sterile medium was troduced into the segment opening onto the skin ther at operation, or 24 or 48 hr. later. urteen of the infected animals were dead within hr. of infection; 10 of 14 had diarrhea before ath and in 7 it was severe. At postmortem, a stended cecum and colon, containing clear rice- ter fluid and flakes of intestinal contents re found in all but 1 of the animals. Of 7 fected animals which lived more than 48 hr., had diarrhea. Fluid taken from separated segments of 8 animals grew cultures of V. cholerae. It is concluded that a toxin of principal importance was absorbed into the blood of infant rabbits from V. cholerae in a separated segment of jejunum and produced characteristic signs of cholera in the animal.

8955 AN EXPERIMENTAL STUDY ON THE PATHOGENESIS AND PREVENTION OF PERITONEAL ADHESIONS. (Jap.) Ohtawa, Y. Igaku Kenkyu (Acta Med. [Fukuoka]) 36(5):548-564, 1966.

Three groups of dogs (10 kg) were laparatomized and peritoneal adhesions stimulated by mechanically abrading the surface of the ileum or by application of chemical agents to the ileum in a standardized procedure involving 10 linear cm of the intestine. Both methods produced adhesions of the same degree of severity in the group of animals receiving no other treatment (control group). Histamine levels (determined by chromatography) in this group rose gradually to a max. within 6 hr. which av. 49 μg/g of ileum and yielded in other animals in this group an adhesion index of 0.99. In the second group each animal received a series of 5 i.v. inj. of sinomenine, each 5 mg/kg body wt. before the abrading or chemical treatment. Not only was the level of histamine much reduced (av. max., 16.9 μg/g of ileum) but the adhesion index was only 0.10. The animals in the third group were subdivided and treated with 2 different antihistamines, methdilazine HCl (Tacaryl) and diphenylhydramine (Restamin). Methdilazin was admin. only after the operation (1 mg/kg x 4); the adhesion index was 0.63. Diphenylhydramine was admin. to 2 series of animals: 1 series received 3 mg/kg i.m. for 4 times after the operation; the adhesion index was 0.42; the other series received 3 mg/kg i.m. for 3 times before the operation and 3 mg/kg i.m. for 4 times after the operation; the adhesion index for this series was 0.18. The histamine levels were about proportional to the adhesion indices. A significant suppression of the inflammatory reaction was seen predominently in the second group, pretreated with sinomenine, upon histological study.

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See also abstract nos.: 9060,9065,9146,9149

CLINICAL AND HISTOPATHOLOGICAL INVESTIGATIONS OF THE RESULTS OF LARYNGECTOMY FIED BY POLYESTER COATING OF THE OESOPHAGEAL . (E.) Radzimiński, A. (Med. Acad., Lodz, nd) and S. Szendzikowski. Acta Otolaryng. ckholm) 63(4):377-383, 1967.

rol examinations, on 15 surviving patients of otally laryngectomized for cancer, were made yr. after the operation where knitted Dacron were implanted to reinforce the esophageal . The 15 patients did not report any serious laints, were able to swallow liquids and d food normally, the scar was smooth in the operative area, and no apparent thickening he skin or within the underlying tissues rred. No fistulas were encountered. Allotic reinforcement of the esophagus was pered in 8 other patients previously subjected -ray cancer therapy; in 5 of these patients surgical wound was totally healed within 10 of surgery; in 2 patients skin and muscle osis developed necessitating the excision of necrotic tissue. The polyester net became ded; in spite of this, the peripheral parts he implant became satisfactorily incorporated subsequent complete healing and normal scar ation. In the last patient extensive necrosis local suppuration caused total sequestration he implant and resulted in an esophageal ula. The use of Dacron nets seems to reduce operative complications after X-ray therapy, necessity of prolonged postoperative treat-, and further multistage plastic operations. ication of knitted polyester net after ngectomy provides conditions favorable to closing of tissue defects as well as complete ing of the surgical wound. Of the 5 patients lly laryngectomized who died within the first operative yr., 4 died of cancer and the fifth on the 16th postoperative day from bilateral renous pneumonia and circulatory failure. his last case necrotic tissue had not dised the implant; the peripheral parts of the were already incorporated and tightly bound he surrounding tissue; parts of the net were ed with poorly vascularized granulation ue with multifocal inflammatory infiltration ly of neutrophil granulocytes. One case g of recurring cancer showed dislocation of implant with formation of a fistula; the r portion of the net was incorporated.

5 LOSS AND REGENERATION OF THE ESOPHAGEAL MUCOSA IN PEMPHIGOID. (E.) Foroozan, VA Hosp., Milwaukee, Wisc.), T. Enta, D. H. hip and J. S. Trier. Gastroenterology 52(3): 558, 1967.

al esophageal biopsies (13 esophageal, 2 nal, 2 rectal) were studied from a 71-yr.-old with pemphigoid after he had sloughed a of the esophageal squamous epithelium. ial biopsies showed no evidence of esophageal epithelium by conventional histological technics, whereas jejunal and rectal biopsies were normal. Clinical symptoms were minimal, although significant abnormalities in esophageal motility were demonstrated. Histologically detectable epithelial regeneration began during the fourth week following loss of the epithelium, and regeneration appeared to progress at the same rate along the entire length of the esophagus. Esophageal motility reverted toward normal within 2 mo. after loss of epithelium. Some residual thinning of the squamous epithelium of the esophagus persisted even after 8 mo. No stricture formation was noted.

9016 FIBEROPTIC AND CONVENTIONAL ESOPHAGOSCOPY IN THE DIAGNOSIS OF ESOPHAGEAL VARICES. A COMPARISON OF TECHNIQUES AND OBSERVERS. (E.) Conn, H. O. (VA Hosp., West Haven, Conn.), H. Binder and M. Brodoff. Gastroenterology 52(5):810-818, 1967.

Both Ba contrast examination and esophagoscopy methods have proved unsatisfactory. Splenoportography presents difficulties and ammonia tolerance tests are indirect and inferential. The present investigation compared conventional with fiberoptic esophagoscopy in the same patients at the same time. Ba esophagograms and ammonia tolerance tests were used as relative, rather than absolute, evidence of the presence or absence of esophageal varices. In the 54 patients of the experimental population esophageal varices were reported by the conventional Eder-Hufford esophagoscope in 21 (39%) and by LoPresti fiberoptic examination in 19 (35%). There was agreement among the methods in 70% of the trials. Radiological interpretations supported conventional esophagoscopic diagnosis in 37 (69%) and fiberoptic interpretations in 35 (65%). Ammonia tolerance tests agreed with conventional esophagoscopy in 31 of 41 patients (76%) and fiberoptic esophagoscopy in 29 (70%). The latter procedure was accepted by patients as easier than conventional esophagoscopy. Diagnostic discrepancies resulting from the use of the 2 methods could be attributed to observer variation along with differences in procedural technic. It is concluded that fiberoptic esophagoscopy in experienced hands appears to provide safe and reasonably accurate diagnosis of esophageal varices, although the need for precise criteria is emphasized.

9017 ESOPHAGOPLASTY BY INTESTINAL TRANSPLANTATION TO THE NECK. AN EXPERIMENTAL AND CLINICAL STUDY. (Fr.) Noirclerc, M. (Salvator Hosp., Marseille, France), C. Malmejac, J. M. Paoli and J. Dor. Ann. Chir. 21(7-8): 394-399, 1967.

Esophagoplasty was tried in 2 series of dogs and later in 2 humans. In the first series of dogs, transplantation of a segment of the small intestine was made into the neck region with proper vascular connections; in the second series the intestinal segment was grafted in place of the esophagus. Resection of 30-40 cm of intestine was not difficult in a dog weighing more than 25 kg. In the upper region of the small intestine a resection caused difficulties due to destruction of extensive lymphatic vessels in the superior mesentery; a segment of ileum excised just above the ileocecal junction was ideal; this region is supplied by network of vessels. Continuity of the ileum was re-established by end-to-end anastomosis; meanwhile the excised segment was perfused by heparinized aerated blood, as the neck was prepared for the transplant or graft; the superficial lateral region of the jugular in the neighborhood of joining with the facial vein was used for the venous connection. Arterial connection was made with 1 of 3 arteries; the common carotid, the superior thyroid, or the external carotid. Excision of the esophagus preceded grafting in the second series of dogs. The apparatus of Nakayama was used for arterial anastomosis while the veins were sutured by hand. There were 19 dogs in the first series; the blood vessels were open in all cases at the onset; in 6 cases thromboses formed in a short time; in others, vascular connections developed *in situ*. The 4 animals in the second series survived with functional grafts. The 2 human subjects were operated upon in the same manner with the addition of vascular connections to the internal mammaries in the region of the second and third intercostal spaces due to the greater size of the grafts; in 1 case death occurred on the sixth postoperative day due to retroperitoneal hematoma in the mesosigmoid region; the graft was in excellent condition at autopsy. The second case was successful and functional.

9018 GASTRIC ULCER AT THE NECK OF THE HIATAL HERNIA. (Fr.) Ledoux-Lebard (Cochin Hosp., Paris), Y. M. Laurent, D. Lallemand and G. De Vannoise. *Progr. Med. (Paris)* 94(20): 801-808, 1966.

Specific symptoms have not been observed in this condition. A gastric ulcer alone, or an isolated hiatal hernia can give rise to the same type of symptoms: postural pain, belching, pyrosis, regurgitation, dysphagia. As in all gastric ulcers the symptoms tend to be periodic. Certain complications, common to the 2 disorders also occur in this condition; hypochromic anemia and hemorrhage. Epigastric cramp is very frequent, especially in conjunction with pyrosis, often periodic. Excessive vomiting may produce esophagitis with perforation sometimes occurring. The radiologic pictures are variable. The hernia, often in the shape of a fist, may be very large; very frequently the mucosa of the herniated pouch is abnormal with thick irregular folds. The ulcer, usually in the small curvature, sometimes reached 3 cm in diameter; in other cases it was very small. Reports of hiatal hernia in association with adjacent ulce are rare in the literature. This report is based upon 11 cases. The patients, (from 40-90 yr. old) were about 66% women, and 75% were anemic with depressed RBC. Surgical results were excellent with only 1 death in a 78-yr.-ol man, whose generally poor condition precluded operation and who therefore was treated medical Others treated medically were much improved, although the hernia was not reduced.

9019 OESOPHAGEAL HIATUS HERNIA: LONG-TERM RESULTS OF THE CONVENTIONAL THORACIC OPERATION. (E.) Pearson, J. B. (Queen Elizabe Hosp., Birmingham, England) and J. G. Gray. *Brit. J. Surg.* 54(6):530-533, 1967.

A total of 64 patients (45 women, 19 men) were reviewed on an av. 6.5 yr. after surgical repai of their hiatus hernias by the Allison procedur 45 were seen 5 or more yr. after operation. Symptoms were present for more than 4 yr. in over half at the time of operation. Predominan symptoms included pain and heartburn in 46, regurgitation in 34, vomiting in 25 and dysphagia in 20. Ten patients attributed the onset of their symptoms to pregnancy and 3 patients had a family history of hiatus hernia. Scoliosis, often stated to be associated with hiatus hernia, was present in only 1 patient while preoperative radiography revealed the presence of reflux in all patients. Of 56 with visible hernia, 5 had the paraesophageal variety, 3 of which were associated with slidi hernia, the most common type. The sliding hernia was large in 15 and incarcerated in 10. There were 2 patients with stricture and 1 with esophageal ulcer (peptic). Esophagoscopy of 14 patients before operation indicated 10 with esophagitis and 3 with a stricture not shown radiographically. No operative mortality occurred. The av. hospital stay after operatio was 15 days. One patient had a recurrence of hernia through the hiatus in the first 24 hr. and was cured with reoperation on the second da 4 patients developed deep-vein thrombosis in th legs and 1 had a small pulmonary embolism. The 31 patients assessed as cured were completely symptom-free at follow-up time; 22 improved patients had mild complaints only and considere the operation worthwhile. There were 11 patien unimproved, thus clinical successes numbered 53 of 64 (83%). This contrasted with only 40% considered as radiological successes. Of 31 wh were completely symptom-free, 11 had reflux on Ba swallow; in addition to reflux, 3 had small hiatus hernias and 1 a paraesophageal hernia. Of 22 cases who improved but were not cured, 15 reflux, (a higher proportion than in the cured group); besides reflux, 5 had small hiatus hernias and 1 a paraesophageal recurrence. Seven of 11 failures had reflux; all had hiatus hernias, and 1 had a stricture. Thus, radiological successes numbered only 22 of 55 (40%). It is suggested that closure of the hiatus behind the esophagus is responsible for the disparity between radiological and clinical

ults, and that suture of the right diaphrag-
ic crus in front of the esophagus, as recom-
ded by Collis, will produce better correlation
ween radiological and symptomatic improvement.

0 THE INCIDENCE OF HIATUS HERNIA AND THE
INCIDENCE OF ITS SYMPTOMS. (Ger.)
nberger, F. (Barmherzigen Bruder Hosp.,
zburg, Austria). Radiol. Austria 17(1):59-65,
7.

2409 examinations of the stomach, almost 20%
hiatal hernia. This high incidence may have
ulted in part from X-ray diagnosis of the
tus cardia in motion. Among the 2409 patients,
(19.7%) had hiatal hernia, 236 (9.9%) ulcers,
33 (1.4%) had neoplasms. Of those with
tal hernias, 65 were under 30 yr., 156 were
ween 30 and 50 yr., and 254 were over 50 yr.;
had definite symptoms; 180 had problematic
ptoms; 205 had no symptoms. Symptomatology
determined from medical history and X-ray
ords and included: dysphagia, retrosternal
n, reflux complaints, dependency of pain upon
ition, pressure in the upper abdomen; un-
asant sensation in the region of the stomach
heart, and pyrosis. Those with problematic
ptoms, i.e., the X-ray picture showed no
lux, the esophagoscope showed normal mucosa
the medical history was not definitely
racteristic, complained of pressure in the
er abdomen, unpleasant sensation in region of
mach and heart with pain eventually radiating
ard the left, and sometimes pyrosis. The
gest group (205 patients) had no pains
cifically attributable to hiatus hernia.

1 A DYNAMIC TEST OF SPHINCTER STRENGTH:
ITS APPLICATION TO THE LOWER ESOPHAGEAL
INCTER. (E.) Pope, C. E. II (U. Washington,
ttle). Gastroenterology 52(5):779-786, 1967.

surement of sphincter closure force was
ieved by utilizing intra-luminal infusion of
ter quantities of fluid. This infusion caused
elevation in recorded pressure (yield pressure)
en the catheter tip was within a sphincter.
yield pressure agreed exactly with the
sure force in a model sphincter and predicted
el sphincter strength more exactly than other
thods currently employed for sphincter measure-
t. The infusion system was used to study 40
jects whose degree of lower esophageal
incter competence was defined on either
nical grounds (heartburn) or by objective
asurement (Tuttle test). Subjects with
petent sphincters had significantly higher
eld pressures than did those without competent
hincters. The overlap of yield pressures was
ast when the presence or absence of competence
s defined by the Tuttle test. No significant
fference between competent and incompetent
hincters was found when resting lower esophageal
hincter pressures were measured. It is con-
uded that infusion of μliter quantities of
fluid into the lumen of a closed sphincter allowed more accurate prediction of sphincter closure force than did static measurement of intrasphincter pressure.

9022 OESOPHAGEAL SENSITIVITY TO MECHOLYL IN SYMPTOMATIC DIFFUSE SPASM. (E.)
Kramer, P. (Boston U. Sch. Med. Mass.), B. Fleshler, E. McNally and L. D. Harris. Gut 8(2):120-127, 1967.

A group of patients with symptomatic, diffuse esophageal spasm (8 men, 6 women, aged 38-73 yr.) received methacholine (2-3 mg, initial i.m. dose; increased by 2-3 mg per dose every 25 min. to max. doses of 6-10 mg or until a hypersensitive response was achieved). Characteristic, lumen-obliterating esophageal contractions were induced in 11 of 14 (in response to doses of 2-6 mg) with sufficient force to expel all the air from a balloon placed in the lower-third of the esophagus for balloon-kymography. In all 9 patients with asymptomatic, diffuse esophageal spasm (3 men, 6 women, aged 56-72 yr.), doses of 6-10 mg failed to induce more than very slight changes of motility, similar to those manifested by a group of normal controls over 50 yr. of age. Among the symptomatic patients, pretreatment tonus was elevated in 3 of 14; wave patterns were irregular in 8 of 14; manometric tracings confirmed diffuse spasm on swallowing in all 8 who were so tested, accompanied by opening of the sphincter in all 6 in whom this was also studied. Comparable tabulations among asymptomatic patients were 0 of 9, 7 of 9, 2 of 2 tested and 2 of 2 tested, resp. It is concluded that the varied patterns elicited by X-ray of patients with symptomatic, diffuse esophageal spasm may be only variant manifestations of the same hypersensitive response. It is also suggested that symptomatic, diffuse esophageal spasm and cardiospasm may be closely related in view of the similar response to parasympathomimetic agents shown by both groups of patients.

9023 STUDIES ON ESOPHAGEAL MOTILITY IN NORMAL SUBJECTS AND IN PATIENTS WITH HIATUS HERNIA AND SCLERODERMIC ESOPHAGEAL DISEASE. (Sp.) Dávila, M. (San Juan de Dios Hosp., Santiago, Chile), F. Rufín, E. Parrochia and R. Armas Cruz. Rev. Clin. Esp. 104(4): 316-322, 1967.

Esophageal motility was studied in 6 normal subjects (4 men and 2 women), 7 patients with scleroderma of the esophagus, and 5 patients with hiatus hernia. Two catheters and a microelectrode were inserted at the level of the middle portion of the esophagus and at the gastroesophageal junction; the catheters were connected to a Statham P23D6 Strain Gauge, to a Simultracer Recorder, and to a Beckman Zeromatic-type potentiometer. Motility was recorded under normal conditions, 10-15 min. after i.m. inj. of carbachol (0.25 mg), and 10-15 min.

following subsequent s.c. inj. of atropine (1 mg). In the region of the gastroesophageal sphincter, length, pressure (cm H_2O) at rest, relaxation, and during contraction were 4 cm., 7.52, 13.7, and 10.4, resp., in normal subjects; 2.5 cm, 3.9, -, and -, resp., in patients with scleroderma; 2.5 cm, 7.2, 14.5, and 13.1, resp., in patients with hiatus hernia. At the level of the middle portion of the esophagus, pressure at rest, pressure of contraction waves, and propulsion were -4.3 cm H_2O, 33.3 cm H_2O, and present, resp., in normal subjects; -2.4 cm H_2O, 6.9 cm H_2O, and absent, resp., in patients with scleroderma; -7.8 cm H_2O, 57.1 cm H_2O, and present, resp., in patients with hiatus hernia. Distinguishing characteristics in patients with scleroderma consisted of preservation of pharyngoesophageal sphincter and motility of the superior portion, altered function of the gastroesophageal sphincter and inferior portion, but positive response to carbachol (as opposed to patients with achalasia). The most frequent signs of hiatus hernia included sphincter ascension (2 patients), double respiratory inversion (2), sliding (2), sphincter elongation (1), double pressure peak (1), hypo-relaxation (1), and hypercontraction (1). The value of the technic in the diagnosis of esophageal diseases is stressed.

9024 ACHALASIA AND ESOPHAGEAL CARCINOMA. (E.) Just-Viera, J. O. (U. Michigan Hosp., Ann Arbor), J. D. Morris and C. Haight. Ann. Thorac. Surg. 3(6):526-538, 1967.

The incidence of carcinoma of the esophagus in patients with achalasia is probably higher than suspected since diagnosis is usually delayed due to the absence of early obstructive symptoms because of dilatation of the esophagus. In a series of 148 patients with achalasia, 5 have developed carcinoma. The 5 cases involved 5 men whose ages were 58 yr. in 2 cases, 43 yr. in 2, and 37 yr. in 1 case. This last case demonstrated that young patients with achalasia should be examined carefully since carcinoma of the esophagus occurs far earlier in patients with achalasia than normally. When the patient showed a change in symptoms, temporary improvement was obtained by transabdominal Heller myotomy, vagotomy and pyloroplasty, but since esophagoscopy was not performed, the neoplasm was not detected. Six wk. later when symptoms recurred, esophagoscopy led to detection and the neoplasm was removed but metastases were seen at operation. The patient died 6 mo. later. A similar pattern of symptom changes, as well as poor prognosis, occurred in the other patients where changes included clubbing, wt. loss, anemia, hematemesis and melena. In one case radiation therapy and radical surgery gave apparent control of the esophageal cancer as the patient is still living, 2.5 yr. following resection. Relief of stasis in patients with achalasia offers the best means of prevention of carcinoma, while surveillance consisting of esophagograms, cytological examination of esophageal secretion and esophagoscopy are essential.

9025 THE TREATMENT OF CARDIOSPASM. (Ger.) Reeh, K. (U. Clin. Frankfurt/Germany) and H. Blaha. Bruns Beitr. Klin. Chir. 214(3) 280-297, 1967.

A group of 61 patients with achalasia (29 male and 32 female without marked distribution of a or sex) were treated by nonoperative and then, if required, by surgical methods. Duration of achalasia from initial symptoms to examination prior to treatment was 5 yr. in 6 cases, 10 yr in 19, 15 yr. in 14, etc., to over 40 yr. for subjects. Mild and severe forms of achalasia occurred each with its own characteristics. T object of treatment was the coordinated passag of foodstuffs through the esophagus into the stomach while retaining the valvular function the cardia to prevent reflux; if this could be accomplished without surgery the risk of reflu esophagitis is greatly decreased or eliminated A tube for introducing food into the stomach i an emergency measure occasionally producing effective dilatation. The use of a bougie was sometimes required; for if a bougie will not p dilatation is not possible. The dilatation ca be pneumatic or hydrostatic or by instrument. The technic used was that of Starck. After a 24-hr. fast and premedication with atropine an pethidine (Dolgntin) and spraying the pharynx with tetracaine (Pantocain), the dilator was introduced into the esophagus; when in correct position the dilator was expanded and left expanded for a time. More than 1 session was sometimes required to attain max. stretching. Eleven patients showed improvement clinically and in X-ray examination; 31 others were great improved and underwent repeated treatment in only a few cases; relapse in only 2 instances required surgery. Eight different surgical technics are outlined while the one used in al except 2 cases was the extramucosal cardiomyotomy of Heller. Success is reported for 8 8 cases with the Heller operation, and the 2 performed by gastroesophagostomy were also successful. Medical treatment was required in only 9 patients. These cases were followed-up from 1-14 yr. with the surgical cases reportin no untoward symptoms.

9026 ESOPHAGITIS AND THE ROLE OF THE ESOPHAGEAL ACID PERFUSION TEST. (E.) Hyman, H. L. (Allentown Hosp., Pa.). Med. Tim 95(8):844-849, 1967.

9027 SURGICAL ASPECTS OF PEPTIC ESOPHAGITI TREATMENT. (Fr.) Ribet, M. (City Hosp., Lille, France), C. Gautier-Benoit and P. Quandalle. Lille Med. 12(5):580-587, 1967.

9028 TREATMENT OF REFLUX ESOPHAGITIS IN SLIDING HIATAL HERNIA BY FUNDOPLICATI BY NISSEN'S TECHNIC. (Cz.) Lhotka, J. (Charles U., Prague), Z. Borek, H. Dvořáková a J. Šetka. Rozhl. Chir. 46(6):409-417, 1967.

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6-7):417-423, 1967.

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32 PREVENTION OF CHEMICAL BURNS OF THE ESOPHAGUS AND STOMACH. (Rus.)
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CINOMA. (Cz.) Nájemnik, J. and Z. Cepek.
hl. Chir. 46(6):383-387, 1967.

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7.

35 BEHAVIOR OF THE CARDIA IN CHAGASIC ESOPHAGOPATHY. PHYSIOPATHOLOGY OF THE
GAS' DISEASE OF THE ESOPHAGUS. (Por.)
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C. Mesquita. Rev. Brasil. Med. 24(5):
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zegl. Chir. 39(6):623-627, 1967.

37 POST-VAGOTOMY DYSPHAGIA. (E.) Guillory, J. R., Jr. and O. T. Clagett. Surg.
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38 CLINICO-RADIOLOGICAL ASPECTS OF ATRETIC ESOPHAGUS OPERATED WITH IMMEDIATE END-
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rgherita Child. Hosp., Turin, Italy), T.
rdini and E. Grassi. Minerva Chir. 22(11):
1-659, 1967.

39 OUR EXPERIENCE WITH ESOPHAGEAL ATRESIA. (It.) Righini, A. (Riuniti Hosp.,
ghorn, Italy). Minerva Pediat. 19(26):
76-1277, 1967.

9040 SUCCESSFUL PRIMARY ANASTOMOSIS IN OESOPHAGEAL ATRESIA AFTER REDUCTION OF A LONG GAP BETWEEN THE BLIND ENDS BY BOUGINAGE OF THE UPPER POUCH. (E.) Young, D. G. (Hosp. Sick Child., London). Brit. J. Surg. 54(5): 321-324, 1967.

9041 TRAUMATIC HERNIA OF THE DIAPHRAGM. (It.) Cainazzo, E. (U. Bologna, Italy). Acta Chir. Ital. 22(Suppl. 1):1-29, 1966.

9042 HYPOPLASTIC LUNGS IN FETAL LAMBS WITH SURGICALLY PRODUCED CONGENITAL DIAPHRAGMATIC HERNIA. (E.) DeLorimier, A. A. (U. California Sch. Med., San Francisco), D. F. Tierney and H. R. Parker. Surgery 62(1):12-17, 1967.

9043 TRAUMATIC DIAPHRAGMATIC HERNIA. (E.) Ebert, P. A. (Johns Hopkins U. Sch. Med., Baltimore, Md.), R. A. Gaertner and G. D. Zuidema. Surg. Gynec. Obstet. 125(1):59-65, 1967.

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9045 DIAPHRAGMATIC HERNIA IN CHILDREN. OBSERVATIONS ON 14 OPERATED CASES. (It.) Piccinni, L. (U. Bologna, Italy), F. Breschi, F. Farruggia and C. Battisti. Minerva Pediat. 19(26):1265-1275, 1967.

9046 RECONSTRUCTION OF THE ESOPHAGEAL HIATUS OF THE DIAPHRAGM IN HAYWARD'S OPERATION OF SLIDING HERNIA USING THE PROTECTED BUMERANG NEEDLE. (Cz.) Králik, J. (Palacky U., Olomouc, Czechoslovakia). Rozhl. Chir. 46(6):373-376, 1967.

9047 HIATAL HERNIA WITH SPECIAL REFERENCE TO THE TWO DIFFERENT APPROACHES. (E.) Muntarbhorn, S. Int. Surg. 48(2):199-202, 1967.

9048 GASTRIC VOLVULUS AND HIATAL HERNIA. (Fr.) Flabeau, F., J. Terquem and J. P. Maugenest. Arch. Mal. Appar. Dig. 56(6): 497-513, 1967.

9049 THE SURGICAL REPAIR OF HIATAL HERNIA: CURRENT CONTROVERSIES. (E.)(Rev.) Earlam, R. J. and F. H. Ellis, Jr. Surg. Clin. N. Amer. 47(4):813-826, 1967.

STOMACH

(Gastric ulcer is placed with peptic ulcer)

9050 CLINICO-PATHOHISTOLOGICAL PARALLELS IN CHRONIC GASTRITIS IN PATIENTS OF DIFFERENT AGE.

(Rus.) Bialik, V. L., R. I. Koroleva, V. S. Novikov, V. Ia. Persidskii and I. A. Shlykov. Vrach. Delo 40(2):24-29, 1967.

A total of 1022 patients (978 men, 44 women) with chronic gastritis were studied. In 43 of Group 1 (8-17 yr. old), normal mucous membrane was found in 53.5%, superficial gastritis in 44.2%, deep gastritis in 2.3%, and atrophic gastritis in none; the values for 765 patients in Group 2 (19-25 yr. old) were 48.5%, 43.4%, 5.6% and 2.5%, resp.; for 154 patients in Group 3 (26-45 yr. old), values were 31.2%, 42.8%, 12.3% and 13.7%, and for 60 patients in Group 4 (46-70 yr. old) the values were 30.0%, 25.0%, 5.0% and 40.0%. Changes corresponding to superficial gastritis were observed in 8 of 32 apparently healthy persons. Increased acidity was found in 25.6% of Group 1, 48.4% in Group 2, 20.8% in Group 3 and 13.3% in Group 4; values for hypoacidity were 23.2%, 24.6%, 31.2% and 28.3%, resp.; for achlorhydria they were 4.7%, 7.8%, 24.0% 48.4%; and normal values were found in 46.5%, 19.2%, 24.0% and 10.0%, resp. An absence of morphological changes in the mucous membrane was found in 62.8% of those with hyperacidity, 51.1% of those with normal acidity, 31.2% of those with hypoacidity and 11.0% of those with achlorhydria. In hyperacidity deep gastritis was found in 2.2%, atrophic gastritis in 1.0%; values at normal acidity were 2.3% for deep gastritis and 1.4% for atrophic gastritis; in hypoacidity they were 9.2% and 5.0%, resp.; and in achlorhydria, 191.% and 39.0%, resp. Thus, increased histological changes of the mucosa paralleled the acid-forming ability of the stomach. Secretion of gastric juice was reduced in deep, and especially, in atrophic gastritis.

9051 X-RAY DIAGNOSIS OF EXCESSIVE MUCOUS MEMBRANE OF THE STOMACH.

(Rus.) Kagan, E. M. (Ministry Health, Moscow). Vestn. Rentgen. Radiol. 42(1):3-13, 1967.

In a study of 123 cases, excessive mucous membrane was located in all portions of the stomach, and was found infrequently in children and more often in subjects over 35-40 yr. old. At the time of examination or earlier, most of the patients had diseases of the digestive tract. Excessive mucous membrane was located in the cardia and gastric curvature in 22 subjects, in the gastric body in 87, close to the lesser curvature in 1, and in the antrum in 14. In the excessive mucous membrane, a variable picture and an absence of navicular traction of the serous membrane corresponding to an observed filling defect was noted; in exophytic material which had developed into an ulcerative or nonulcerative tumor, a variable picture was lacking and navicular traction of the serous membrane was present. In the excessive mucous membrane, the secretory and evacuatory gastric function were only slightly disturbed, if at all; normalization of mucous relief was absent after treatment and clinical
symptoms were absent or slightly pronounced.
gastritis, both gastric functions were disturb
mucous relief was normalized after treatment,
clinical symptoms were present. Differential
nosis of excessive mucous membrane is based on
same principles (therapeutic effects, pharmaco
cal tests); changes related to excessive mucou
membrane are based on a disturbance of hydrody
balance and edema on the basis of anemia, urem
allergy, and various endocrine disturbances.
importance in the differential diagnosis betwe
excessive mucosa and reticulosis are the clini
picture, laboratory data, the presence of enla
peripheral lymph nodes and data of their biops
and the results of radiation therapy. In reti
sis, altered mucosa could be normalized by rad
tion therapy, while excessive mucosa remained
ble under such therapy. Changes analogous to
varicose veins of the gastric cardia are usual
found in the esophagus, in contrast to excessi
mucosa. Basic radiological symptoms include:
ervation of peristalsis in the body and antrum
the stomach; pliability of the upper walls; ab
sence of a palpable tumor in the region of the
clearly visible filling defect; presence of an
additional shadow corresponding to the visible
filling defect; variability of the radiologica
picture in the process of examination and recu
rence of its basic properties even during a pr
longed observation; and a normal relief of the
mucous membrane along the lesser curvature. D
ing radiologic observation of 29 patients for
5 to more than 8 yr., no changes were found wh
compared to the initial picture. Three case histories are presented in detail.

9052 ELECTROGASTROPHY IN GASTRITIS, GASTR
DUODENAL ULCER AND GASTRIC CANCER.

(Rus.) Makos, R. P. (Ivano-Frankovsk Med. Ins
USSR). Ter. Arkh. 39(1):32-37, 1967.

Electric potentials (from the surface of the
body and mucosa of the stomach), motility, ton
and gastric secretion were studied in 19 patie
with gastric cancer; 37 with gastric ulcer and
with chronic gastritis (mostly males, 30-60-yr
old; 35 had hyperacidic gastritis, 23 hypoacid
and 28 anacidic) of 3-16-yr. duration and in 1
healthy normals (the controls; 22-45-yr. old).
Electrogastrograms revealed a complex of diffe
waves; rapid waves reflected rhythm and depth
of gastric contractions, slow, brief waves reflected fluctuations of gastric tonus, slow
waves reflected secretory activity, and large
drops of the recorded level reflected changes
in acidity. In stomach diseases, gastric elec
trical potentials changed in parallel with
motility, secretion and tonus; the character o
these changes reflected, to a large degree and
were dependent upon, the character of the path
logical process. In peptic ulcer and chronic
hyperacidic gastritis, there occurred hyperkinetic dyskinesia of fluctuations of electric
potentials, tonus and gastric contraction. In
gastric cancer, hypoacidic, and (especially)

idic gastritis, these fluctuations were hypo-tic compared to normal findings. The character, ee and duration of some medical compounds opine, antihypertensive agents, papaverine, amine, HCl) on motility, tonus and gastric etion were also reflected on the electro-rogram.

3 ARGENTAFFIN CELLS IN EXPERIMENTAL GASTRITIS. (Ger.) Rodriquez-Olleros, A. Puerto Rico, San Juan) and R. Barroso-Mogel. astroent. 5(2):75-78, 1967.

phic gastritis was produced in rabbits by itization to human gastric juice dialyzed at and then vacuum dried; a dose of 12 mg in ne was inj. twice/wk. for 12 wk. Papillomatous ritis was evoked in rabbits by instillation .5 ml of 0.5% croton oil in an equal vol. of hol-ether twice/wk. for 6-9 wk. Ulcerative ritis was caused in dogs by the twice/wk. n. of 2 g cincophen; the animals were killed days after the last dose. The stomach of y animal was fixed in formalin; thick sections stained with hematoxylin-eosin, and the ntaffin cells according to the method of oso-Mogel. The number of argentaffin cells he gastric mucosa in animals with experimental phic gastritis was definitely reduced. The er of these cells, however, was noticeably eased in animals with papillomatous gastritis ced by croton oil. In the edematous necrotiz-phase of erosive gastritis caused by cincophen, ntaffin cells were almost completely lacking, in this phase the covering epithelium showed plasia of goblet cells. Inasmuch as argentaf-cells are the source of serotonin, a change he relative number of these cells will affect functions controlled or affected by serotonin.

4 CLINICAL ASPECTS OF EXAMINATION OF THE GASTRIC MUCOSA BY BIOPSY. (Ger.) ger, H. (Kaiserin Elisabeth Hosp., Vienna). . Z. Inn. Med. 48(2):70-71, 1967.

tudy was made correlating 1) the histologic tures of the gastric mucosa of 360 patients, ailing 993 biopsies; 2) the degree of gastric dity; and 3) the age of the patients. As is wn, the greatest percentage of cases with eracidity had a normal gastric mucosa. In ients passing through the stages from super-ial to atrophic gastritis, hyper- and normal dity had disappeared, the degree of hypoacidity reached 80%, and increased to 86% in gastritis changing or already altered mucosal structure. case of complete achlorhydria was found in junction with a normal mucosa, although 13% normal gastric mucosa had mild hypoacidity 18% more pronounced hypoacidity. Cases of y pronounced hypoacidity were found in the up with an av. age of 28 with a histologically mal mucosa. Older patients with pronounced oacidity did not present a normal mucosa; these patients gastritis had progressed to the atrophic state in which the greatest incidence of hypoacidity and achylia were demonstrable; 8% of the older patients had hyperacidity, 18% had normal acidity, 35% mild hypoacidity, 26% pronounced hypoacidity and 13% achylia. Half of those having a normal gastric mucosa in the 50-70-yr. age bracket had hyperacidity. Those who retained a normal mucosa tended to hyperacidity whereas those with developing atrophic gastritis tended to become achylic.

9055 THE QUESTION OF THE CIRCUMSCRIBED AREA TYPE OF GASTRITIS. (Ger.) Frank, A. (Rudolfstiftung Hosp., Vienna). Wien. Z. Inn. Med. 48(2):57-65, 1967.

Biopsies were not sufficient for the certain diagnosis of "bedded circumscript gastritis." X-ray examination was of great value to differentiate this form of gastritis from neoplasms, as illustrated with 5 cases. The region affected in all 5 cases was the greater curvature; 1 case had no gastric acidity and in another acidity was deficient; all suffered stomach pain, or pain on palpation in the gastric region, X-ray examination revealed a circumscribed area, up to 9-cm in diameter, raised up to 15 mm, with numerous folds or plicae. Two of the 5 showed erosion of the mucosal surface. Conservative treatment was given in 3 cases, 2 were resected. The observation period of 1 of the operated cases extended over 8 yr. with no recurrence. The differentiation of this form of gastritis from cancer by X-ray is dependent upon 3 factors seen in gastritis: 1) Peristaltic movement is often well preserved, or at least pharmacologically provable. 2) The highly thickened plicae resemble gyri of the brain. 3) Repeated examinations show structural changes in the plicae. The erosion at the top of the gyri in 2 cases demonstrated the inflammatory genesis of these alterations. Lymphocyte infiltration was seen in the muscularis mucosae and in 1 instance, to a very minor degree, in the muscularis propriae. The mucosa itself in the affected areas was infiltrated with lymphocytes and plasma cells. "Circumscript bedded gastritis" may be a special form of erosive gastritis.

9056 OBSERVATIONS ON THE COURSE OF "GIANT FOLD" GASTRITIS. (Ger.) Ellegast, H. (U. Clin. Vienna) and N. Stefenelli. Wien. Z. Inn. Med. 48(2):51-57, 1967.

"Giant-fold" gastritis was observed in 23 cases for an av. of 3 yr.; the oldest case was of 14 yr. duration; in many of these the clinical and radiologic diagnosis had been confirmed by biopsy. A few patients have undergone gastroscopic examination. Cases with similar aspects have been mistaken for known malignant changes in the wall of the stomach, malignant changes in the mucosa, the result of systemic disease, allergic manifestations, and others; finally, it is recognized as a giant-fold formation which has no particular or peculiar clinical symptoms. This giant-fold formation in some ways resembles the Ménétrier Syndrome; however, in no case is it marked by a gastrointestinal loss of protein; there is never any adenomatosis of the mucosa. The patients are mostly between the ages of 40 and 60, and are about equally male and female, who experience a pressing pain in the stomach. A feeling of illness, vomiting, fatigue, loss of appetite and large wt. loss follow; at times, there is slight bleeding from the stomach; the stomach region becomes tender. Gastric secretion is increased. The radiologic picture shows the large, swollen, curving, continuing folds which do not disappear or become obliterated; these folds resemble gyri, sharply defined and circumscribed, they may be found in the fundus in the greater curvature of the body, the angelus as well as in the antrum. Peristalsis may be depressed but it is never destroyed as in some neoplasms. Histology of longer-standing cases shows infiltration of round cells, bleeding in the stroma. Hypertrophic changes of the mucosa have never been found. The course of the disease becomes uncommonly chronic in most cases, reaches a static condition and persists. Upon histologic observation over a period of yr. there seems to be a tendency toward atrophy of the mucosa. An improvement has been noted in only a very few cases.

9057 AGE DEPENDENCY IN GASTRITIS DEMONSTRABLE BY BIOPSY. (Ger.) Seifert, E. (Hanusch Hosp., Vienna) and H. Knoll. Wien. Z. Inn. Med. 48(4):145-151, 1967.

Biopsies were taken from the fundus of the stomach in 1000 cases with complaints of the upper abdomen. The determination of mucosal changes was according to the system of Henning and Heinkel: 1) normal; 2) light-to-moderate superficial gastritis; 3) moderately-severe to severe superficial gastritis; 4) superficial gastritis with beginning atrophy, 5) and atrophic gastritis or structural alterations resulting from gastritis. Patients between the ages of 14 and 70 yr. were investigated; younger patients did not appear in the division and older patients were too few to be included. Of the 1000 patients, 225 were in Group 1, i.e., normal; 322 in Group 2, 293 in Group 3, 95 in Group 4 and 65 in Group 5. In the age group 14-20 yr. there were 50 cases: 46% (1), 28.0% (2), 22.0% (3), 4% (4), and 0% (5); in the age group 21-30 yr., 143 patients, 49.6% (1), 28.0% (2), 21.0% (3), 7.4% (4), 0% (5); in the age group 31-40 yr., 178 patients, 33.7% (1), 34.2% (2), 27.0% (3), 3.4% (4) and 1.7% (5); in the 41-50-yr. group, 193 patients 13.1% (1), 43.0% (2), 29.0% (3), 17.8% (4) and 3.7% (5); in the 51-60-yr. group, 265 patients, 12.1% (1), 32.1% (2), 32.4% (3), 14.3% (4), 9.1% (5) and in the 61-70-yr. group, 171 patients, 8.2% (1), 22.8% (2), 36.3% (3), 14% (4) and 18.7% (5). The obvious shift is toward the right from the normal toward the atrophic in the advancing age groups. This is not, however, a true aging process but the result of inflammatory activity in a specially-select pathologically-inclined group of patients. Th authors believe that the patients with gastric atrophy show an inclination toward the develop of cancer.

9058 CHRONIC GASTRITIS IN THE REGIONS OF ANTRUM AND BODY. (Ger.) Friedrich, (Humboldt U., Berlin), G. Lisewski and H. Davi Deutsch. Z. Verdau. Stoffwechselkr. 26(5-6): 213-218, 1967.

Biopsies were taken in the antrum and body in the forward wall near the greater curvature fr 90 patients of both sexes. The tissues were prepared for histology by the usual methods. Henning's system for the classification of the gastric mucosa was followed: 0, normal mucosa I, minor superficial gastritis; II, definite, chronic superficial gastritis; III, chronic superficial gastritis with partial atrophy, IV chronic atrophic gastritis. The gastric chang were more marked in the body of the stomach of 12 patients and in the antrum of 33. In 45 ca full agreement between the antral and body fin ings occurred. Where differences occurred betw the histologic pictures of antrum and body the were usually only minor. In only 7 cases was the difference strong. The antral biopsy in most cases presents a true reflection of the bo biopsy.

9059 HISTOLOGICAL EFFECT OF CERTAIN PICKL ON THE HUMAN GASTRIC MUCOSA: A PRELIMINARY REPORT. (E.) MacDonald, W. C. (Cytological Diagnostic Lab., Vancouver, Britis Columbia), F. H. Anderson and S. Hashimoto. Canad. Med. Ass. J. 96(23):1521-1525, 1967.

By means of repeated peroral suction biopsies the histological effects of human gastric muco of the Japanese foods, sake lees (white cucumbe in rice wine mash), fukujinzuke (radish, eggpla beans, bamboo shoots and beefsteak leaves in soy sauce) and takuan (salted white radish) as well as gherkin pickles, raw carrots and raw cucumbers were obtained from 3 healthy males wh usually adhered to a Western diet. The ingesti of 30 ounces of fukujinzuke or of vinegar gherk over a 3-day period caused marked changes in th surface epithelium and gastric pits in all 3 subjects. The abnormalities consisted of loss of cellular mucus, nuclear enlargement, promine nuclear chromatin and an increased number of mitotic figures. After 20 ounces of fukujinzuk and 10 ounces of sake lees these abnormalities the surface epithelium and gastric pits were seen as well as a marked increase in mitotic count. Some changes were apparent after the ingestion of just 1 Japanese meal. These changes indicate a more rapid turnover of the cells of the pits and surface epithelium in response to irritation. Despite the epithelial cell change no increase was seen in the number of inflammat cells. All control biopsies were normal, as we

opsies after the ingestion of 30 ounces of
w carrots or cucumbers over a 3-day period.

60 SODIUM AND POTASSIUM CONTENT IN MIXED SALIVA OF PATIENTS WITH CHRONIC GASTRITIS
) GASTRODUODENAL ULCER. (Rus.) Vainshtein,
G. (Kazan Lenin Postgrad. Med. Inst., USSR).
r. Arkh. 38(11):37-39, 1966.

liva was obtained from 195 patients (20-65 yr.
d) during fractional study of gastric secretion
aliva secretion was stimulated using gastric
und as a mechanical irritant). The conc. of
and K (in mEq/liter) and the Na/K coefficient
44 patients (21 males, 23 females) with chronic
stritis and reduced acidity was 11.46, 20.52
d 0.57, resp.; in 40 patients (13 males, 27
males) with chronic gastritis and normal acidity,
ese values were 10.45, 20.1 and 0.57, resp.;
22 patients (15 males, 7 females) with chronic
stritis and increased acidity, they were 17.54,
.82 and 0.90, resp.; in 75 (65 males, 10 females)
th duodenal ulcers, values were 18.74, 20.84
d 0.93, resp.; and in 14 patients (12 males,
females) with gastric ulcers, the values were
.43, 20.50 and 1.31, resp. Thus, K conc. did
t fluctuate significantly, while Na conc. in
peracidic gastritis and peptic ulcers was sig-
ficantly higher than Na in the normoacidic
d hypoacidic states of gastritis. Analogous
rrelations were found between these groups in
lation to the Na/K coefficient. The possible
gnificance of these findings are discussed.

61 STUDY OF SO-CALLED GASTRIC ABSORPTION IN CLINICAL CONDITIONS. (Rus.)
immerman, Ia. S. (Perm. Med. Inst., USSR).
vet. Med. 29(12):18-21, 1966.

e permeability of gastric glandular cells was
udied in 174 patients who had various digestive
act diseases: Group 1, 21 patients with gastric
cer; Group 2, 113 patients with duodenal ulcer;
oup 3, 23 patients with chronic gastritis; and
oup 4, 17 patients with chronic cholecysto-
olangitis. Permeability was determined by the
thor's modification of the Pentzoldt-Faber
dine-potassium test, which proved to be a valu-
le indicator of the functional condition of
e gastric mucous membrane. The procedure was
follows: removal of the gastric content on a
sting stomach was followed by admin. of KI
ml of a 3% soln.) and minute determination of
e salivary appearance of iodine (using a 1%
ln. of starch and conc. HNO_3); this was followed
repeated removal of the gastric content and
min. of a test breakfast (7% cabbage decoction,
5% alcohol, etc.). Further examination was
nducted using the method of Lepor. Disturbance
permeability was highest in groups 1 and 3,
ile in the other 2 groups it was less signif-
ant. Permeability (in min.) in all of the
tients before treatment ranged from 11.1 to
.4, and after treatment from 8.3 to 12.215.
ter therapy the permeability (on an empty
stomach and during active secretion) increased in 66 of 102, remained unchanged in 27 of 102 and was somewhat decreased in 9 of the 102 patients; the latter group exhibited atrophy of the mucous membrane and gastric achylia. After application of paraffin in 42 patients (Groups 1-3), intragastric temperature increased by 0.5°; permeability decreased in 24 of 42, remained the same in 12 of 42 and was slightly increased in 6 of the 42 subjects. Titratable acidity of the gastric juice decreased and the digestive strength remained unchanged in 28 of 42. In 86 patients (Groups 1-3), a comparison was made between the therapeutic clinical effect and dynamics of basic gastric functions before and after treatment; this revealed a trend toward normalization of several gastric functions, such as the secretion of uropepsinogen (from 23-37 U/hr.), elimination of neutral red (from 24-38), and gastric gland cells permeability (from 26-37). Titratable acidity and enzymatic activity of the gastric juice remained the same. The hourly secretion of free acid was normalized in several cases; on mechanical stimulation there was an increase of the normal indices of hourly secretion from 39 to 48, and after chemical stimulation, the increase was from 40 to 52.

9062 A METHOD OF STRAIGHTENING GASTRIC FLEXURES. (Rus.) Shniger, N. U.
(Moscow Region Sci. Inst. Roentgen. & Radiol.). Vestn. Rentgen. Radiol. 42(1):22-26, 1967.

Over a 4-yr. period, a clinico-radiological study was performed on 64 patients (42 males, 22 females; 20-68-yr. old) with stable gastric flexure. At radiological examination, complete straightening of the gastric flexure could be obtained in only 14 patients; of the remaining 50 patients, 24 were admitted with suspicion of neoplasm and 18 for perigastritis. At repeat X-ray examination after eating, 52 of 64 showed no gastric deformation, which was preserved or minimized in the remaining 12. In 52 in whom gastric flexure was removed after eating, 10 had a Degree 1 flexure, 31 a Degree 2 flexure and 11 a Degree 3 flexure; 29 had pain in the upper stomach; 22 had regurgitation; 15 had pyrosis; 8, vomiting; 12, sensation of fullness in the epigastrium; 13, nausea, 14, reduced gastric acidity and 7, increased gastric acidity. Careful clinical and radiological examination revealed peptic ulcers in 11, cholecystitis in 6 and suspected appendicitis in 4. In 12 patients with persistent flexures, 5 showed relaxation of the left diaphragmatic cupula of variable degree, and 7 had cancerous tumor and cicatricial ulcerative changes of the stomach. In 5 patients with relaxation of the left diaphragmatic cupula, the most common complaints were regurgitation, sensation of fullness and bulging in the epigastric region. Clinical symptomatology was directly proportional to the degree of the diaphragmatic relaxation and gastric flexure. Gastric cancer occurred in 4 of 7 patients; in 3 of the 7, cicatricial changes were found due to ulcers.

In 6, radiological findings were verified at surgery. In this group the same symptoms predominated which were found in patients with diaphragmatic flexures. Clinical symptomatology was more evident with pronounced flexures. Thus, in the last 2 groups of patients, gastric flexure is also preserved under the conditions of physiological digestion, but the degree of flexure sometimes decreases. In these cases, the clinical picture is conditioned by both the basic disease and by gastric deformation. Two case histories are presented in detail.

9063 DISSEMINATED NECROSIS OF THE GASTRIC MUCOSA OF THE NEWBORN. (Ger.)

Wittstock, G. (Reg. Hosp., Schwerin, Germany). Frankfurt. Z. Path. 76(4):381-387, 1967.

The morphology, histology, age incidence, and correlation with other diseases of disseminated necrosis in the gastric mucosa of infants was examined in 1161 autopsies up to the age of 2 wk. The sharply-defined necrotic areas were small, seldom more than 2 mm across, of a dirty-yellow color; their number varied widely. Conceivably they were very numerous with recognition of only relatively few; they were found in the fundus and body of the stomach, especially in the region of the greater curvature. In many areas the necrosis was limited to the epithelium; in others, the muscularis mucosae and the submucosal connective tissue were involved. Neutrophil and lymphocyte accumulations were sometimes noted. The blood vessels of the submucosa were frequently engorged; vascular erosion was observed. The incidence of necrosis with age was: To 12 hr., 30 of 447, (6.7%); at 12-24 hr., 35 of 209 (16.7%); at 24-48 hr., 47 of 220 (21.4%); at 48-72 hr., 9 of 55 (16.4%); at 3-7 days, 11 of 129 (8.5%); at 7-14 days, 5 of 101 (5%). The incidence of other diseases in 137 cases of disseminated necrosis: 4 with encephalodystrophy (2.9%); 8, brain hemorrhage (5.8%); 66, hyaline membranes (48.2%); 62, amniotic fluid aspiration (45.3%); 33, aspiration of infected amniotic fluid (24.1%); 9, inflammation of the digestive tract (6.6%); 9, miscellaneous (6.6%). The bacteriologic study of infection yielded inclusive results. The etiology of disseminated necrosis of the gastric mucosa is unknown.

9064 GASTRIC SECRETION IN PATIENTS WITH THERMAL BURNS. (Rus.)

Timakov, V. A. (Milit. Med. Acad., Leningrad, USSR). Vestn. Khir. Grekov. 98(1):73-77, 1967.

A tendency toward increased acid secretion and, to a lesser degree, increased enzyme formation by the stomach was found in a study of 181 patients (138 men, 43 women; from 12 to over 45 yr. old) with superficial (70) and deep burns. The frequency and degree of such shifts were incompletely correlated with burn location and depth. Clinically pronounced disturbances of gastric activity were found in only some of the patients. With superficial burns, there was usually a decrease
appetite, moderate thirst and rarely, nausea;
while with deep burns, appetite decreased to co
plete anorexia, plus vomiting and nausea. For
superficial burns, urinary excretion of quinin
increased in 23, decreased in 4 and was normal
18 of 45; resp. values for deep burns were 28,
and 0 in 66 patients studied. Av. values for
quinine excretion when it increased was 268 μg
when decreased it was 42.6 μg and when normal,
81.1 μg. Tubeless analysis showed achlorhydri
in 13 of 40 patients studied. A radiotelemetr
intragastric pH study was performed on 14 pati
with superficial burns and 16 patients with de
burns. The pH was more than 3.5 in half of th
patients with superficial burns of up to 5% of
their surface area, while in patients with bur
of 6-10% of the integument, av. pH was 1.52.
3 of 4 patients with deep burns of less than 5
of the surface area, the pH was approx. 1.5, a
in those with deep burns of more than 10% of
surface area, pH was 1.33. In most patients
during the period of infection resulting from
burn trauma, there was an active secretion of
acid on an empty stomach; its frequency and de
depending upon burn severity. During the peri
of exhaustion due to burn trauma, an active
secretion of acid in the interdigestive phase
was noted in almost all of the patients (8 of
however, the degree of conc. of H ion in gastr
juices was lower than in patients in the postb
infection period. An active gastric secretion
of acid on an empty stomach or after breakfast
was found in 25 of 30 patients studied by radi
capsule. Uropepsin excretion for patients wit
superficial burns increased in 12, decreased i
1, and was normal in 32 of 45 patients studied
the resp. values for those with deep burns wer
24, 3 and 39 of 66 patients studied. For supe
ficial and deep burns, the av. values for norm
uropepsin indices were 48.2 and 37.4 U/hr., re
for increased indices, they were 77.8 and 106.
U/hr., resp. The phenomenon of increased acid
and enzyme excretion by the stomach of patient
with burns is correlated with stimulatory acti
of the products of tissue disintegration on th
gastric glands, such as histamine-like compour
and also with increased activity of the adrena
cortex.

9065 MORPHOLOGICAL CHANGES IN GASTRIC MUC IN PATIENTS WITH THE GASTROINTESTINA FORM OF SALMONELLOSIS AT DIFFERENT STAGES OF T INFECTION. (Rus.)

Sakalinskene, E. M. (2nd
Moscow Med. Inst.). Ter. Arkh. 39(1):37-42, 1

Of 50 patients with gastrointestinal salmonell
and the symptoms of acute gastroenteritis, 20
had a mild course, 27 moderately severe and 3
severe course of the disease. A clinical pict
of an acute inflammatory process infiltrating
deep into the mucous membrane was evident from
the first day of illness and existed when clin
symptoms disappeared. The inflammatory proces
showed simultaneous involvement of tectorial
epithelium, stroma and also the glandular

helium, with symptoms of desquamation and
obiosis. Clinical symptoms disappearance
followed by tectorial epithelium regeneration,
symptoms of necrobiosis and desquamation still
rred in the stromal cells and those lining
glands. These changes were conditioned by
ct action of salmonellae and their toxins on
mucous membrane, and also by hematological
on of these factors. The pathomorphological
ges of the mucous membrane paralleled the
ical symptoms, i.e., the more pronounced the
xication and gastrointestinal symptoms, the
ter the destructive changes in the gastric
us membrane. Patient age was not related to
morphological picture. No difference was
d between bacteriologically confirmed and
nfirmed cases of the diseases.

5 GASTROINTESTINAL BLEEDING: A COMPARISON OF MEFENAMIC ACID AND ASPIRIN. (E.)
ing, A. (Roy. Prince Alfred Hosp., Sydney,
ralia) and K. Bhanthumnavin. Med. J. Aust.
):601-603, 1967.

l blood loss was measured in 53 hospital
ents who were given RBC labeled with ^{51}Cr
μc/10 ml blood). When mefenamic acid [N-
xylyl) anthranilic acid] was given (500 mg
mes a day in 42), blood loss in stools in-
sed from 0.8 to 1.3 ml daily in 26 who passed
than 1.5 ml daily in the control period.
6 who passed more than 1.5 ml daily in the
rol period, blood loss fell from 5.8 to 4.9
aily after mefenamic acid. Controls (11)
ived aspirin (600 mg 4 times daily); here,
daily fecal blood loss rose from 0.7 to 3.5
aily. It is concluded that the capacity of
namic acid to produce intestinal bleeding
light.

7 COLOR PHOTOGRAPHIC EXAMINATION IN CASES OF GASTRIC BLEEDING WITH NORMAL X-RAY
INGS. (Ser.) Gabrielsson, N. (Karolinska
. Stockholm). Lakartidningen 64(24):2465-
, 1967.

tal of 40 cases, 27 men and 13 women (24-89
, av. age 54) with hematemesis and severe
na, the origin of which was not disclosed by
odiagnosis of the stomach, were reexamined
astric color photography; the gastrocamera
used for 36 cases and the combined gastroscope
camera for 4. The gastrocamera can be
led 35°, obviating the dead angles of the
troscope; the combined instruments, like the
troscope, cannot be angled; the camera takes
ictures per load, illuminated by electronic
sh of 1/15 sec. with a fixed focus, taking
rp pictures at distances of 2-10 cm. The
ra is easily introduced into the stomach.
the 40 patients, 24 had hematemesis, 36 melena,
23 had bleeding at time of gastrophotography.
inite diagnosis was made in 31 cases (77.5%);
eding occurred in 12 with mucosal erosion, 9
h ulcers, 7 with varices of the stomach; and
there was 1 with each of the following; polyp, cancer, and suture granulation. The 9 cases with no photographic evidence of cause of hemorrhage also showed no evidence of bleeding at the time of gastrophotography. This technic can reduce the number of X-ray examinations required and increase accuracy of diagnosis.

9068 GASTROCAMERA AND X-RAY INVESTIGATION IN THE DIAGNOSIS OF GASTRIC CONDITIONS. A PRELIMINARY INVESTIGATION OF 102 PATIENTS. (Dan.) Rahbek, I. (St. Elizabeth Hosp., Copenhagen), S. Brünner and J. Mosbech. Ugeskr. Laeg. 129(21):685-688, 1967.

Color pictures of stomach disorders were taken in 102 patients by the gastrocamera at the same time that X-ray examination and X-ray films were made. The diagnostician made full use of color pictures and X-ray material (films and fluoroscopy data). The gastrocamera pictures of 12 patients could not be used because the camera lens became wet with gastric secretion or "red pictures" resulted when the camera was too close to the mucosa. Seven of 13 patients with gastric carcinoma were found by X-ray and 13 of 13 by gastrocamera; the 6 cases of carcinoma, not diagnosed as such by X-ray, were diagnosed as ulcer (4), polyposis (1), and gastritis (1). Among the 77 patients with nonmalignant disorders were 12 who by X-ray were suspected of malignancies (12 tentative false positives), whereas only 3 tentative false positives were reported by the gastrocamera; the same 2 false positives were reported by both methods; diagnosis was definitely made at operation. Of 36 cases of gastric ulcer, 30 were correctly diagnosed by X-ray and 32 by gastrocamera. The diagnosis of gastric carcinoma and the discovery of gastric ulcer can be improved by combining X-ray and gastrocamera studies.

9069 INTRAOPERATIVE BIOPSY OF THE GASTRIC ANTRUM IN LITHIASIS. (Ger.) Stauber, R. (Reg. Hosp., Leoben, Austria). Z. Gastroent. 5(2):79-83, 1967.

Biopsies were obtained at operation for gallstones from 52 patients, 4-5 cm above the pylorus; however, in only 35 of these was the tissue thick enough to differentiate the type of mucosa according to the type of glands. The histologic findings with respect to gastritis were classified by Henning's method. Of the 35 complete biopsies, 13 showed an antral mucosa with typical pyloric glands; 12 were of mixed type, and 10 showed a pure fundic gland structure. In those biopsies having pyloric type glands, mild chronic gastritis was found in 4 and acute exacerbation in 3 of these; moderately severe chronic gastritis in 5, 1 in a stage of acute attack; and 4 with severe chronic gastritis. Each patient with an acute inflammatory attack had a second clinical finding, 2 patients having small duodenal ulcers, 1 stones in the duct, 1 cholangitis, and 1 cholecystitis with empyema. Of the 10 biopsies showing fundic mucosa, 4 had only minimal changes, 5 a moderately severe acute chronic gastritis and 1 was normal (free of any biliary involvement). The 12 mixed or transitional types of biopsies showed 1 normal gastric mucosa, 2 mild superficial gastritis, 5 moderately severe chronic gastritis (4 active, acute) and 4 with severe chronic inflammatory changes; some accompanying conditions were 1 gallbladder to stomach fistula, 1 abscessing cholecystitis, 1 occlusion of the bile duct (stone), 2 acute or chronic pancreatitis and 1 duodenal ulcer. The 17 patients whose biopsies were too shallow for complete evaluation still presented evidence of some degree of gastritis; 3 had chronic gastritis in inflammatory stages; accompanying pathologies were 1 choledocholithiasis with cholangitis, 1 acute pancreatitis, 1 obstructive jaundice (tumor) and 1 severe acute cholecystitis. Of 52 patients, 21 had some degree of chronic gastritis in acute inflammatory stages. Acute, inflammatory stages of gastritis may indicate pathologies of the hepatobiliary, pancreatic, and duodenal regions.

9070 INVESTIGATIONS OF THE EVACUATORY FUNCTION OF THE STOMACH IN HEALTHY INDIVIDUALS WITH THE AID OF A RADIOCAPSULE WITH A pH RECORDER. (Rus.) Votchal, B. E. (Cent. Inst. Advanced Train. Physicians, Moscow) and A. S. Belousov. Ter. Arkh. 39(1):27-32, 1967.

A rhythmic discharge into the duodenum of small portions of gastric material was noted in 37 healthy individuals (25 men, 12 women; 18-35 yr. old) who had been fasting. Depending upon the type of acid secretion in Group 1 (asthenic in 5 of 37, stimulatory in 10 of 37), such discharges were accompanied by pronounced fluctuations of the active reactions of H ions in the duodenum, i.e., pH sharply decreased (to 3.0-4.0) and then rapidly returned to initial indices (7.0-8.0). In Group 2 (inhibitory form of acid secretion in 5 of 37, inert in 7 of 37), discharge of the gastric content did not produce significant changes in duodenal pH; the pH fluctuated between 8.0 and 5.6. In Group 1, during the initial 7-45 min. after consuming bread for breakfast, there was a period of complete inhibition of gastric evacuation followed by a brief (up to 2-3 min.) sequence (of 10-30 sec. duration, and sometimes more) of gastric content discharges which alternated with periods of no evacuation. In Group 2 there was no cessation of evacuation immediately after breakfast. Evacuation from the stomach continued during the initial 10-20 min., and then, with stimulation of the secretory activity of the gastric glands, a period of pyloric closure occurred, followed by a sequence of rhythmic discharges of gastric contents into the duodenum alternating with prolonged (up to 10-15 min.) periods of cessation of evacuation. The apparent dependence of gastric evacuation on the reaction of the gastric secretion confirms the role of the acid factor in the transit of gastric contents into the duodenum.

9071 GASTROSCOPY IN HEMATEMESIS AND MELEN
(Nor.) Myren, J. and P. G. Burhol.
T. Norsk. Laegeforen. 87(9b):835-838, 1967.

In 2 yr. gastroscopy was performed within 24 h
of admission on 77 patients with hematemesis a
melena using Hirschowits' flexible gastroscope
Before the examination each patient received
morphine and atropine, s.c., and the pharynx w
sprayed with a local anesthetic just prior to
insertion of the gastroscope. In 13 subjects
normal gastric mucosa, 6 had never had dyspeps
10 had only 1 hemorrhage, 1 had 2-3, and 2 had
4 or more hemorrhages; av. hemoglobin (in g%)
admission 10.7. In 23 patients with gastritis
and atrophic gastritis: 6 had no dyspepsia; 1
1 hemorrhage; 4, 2-3 hemorrhages; 4, 4 or more
hemorrhages; av. hemoglobin, 11.2. In 16 subj
with gastric ulcer: 7 had no dyspepsia; 11, 1
hemorrhage; 4, 2-3 hemorrhages; 1, 4 or more
hemorrhages; av. hemoglobin, 11.6. Of 3 patie
with gastric tumor: 2 had no dyspepsia; 2, 1
hemorrhage; 1, 2-3 hemorrhages; av. hemoglobin
11.6. Of 14 patients with deformed pylorus:
no dyspepsia; 9, 1 hemorrhage; 5, 2-3 hemorrha
av. hemoglobin 10.9. Of 2 patients with opera
stomach: none had dyspepsia; 2, 1 hemorrhage;
hemoglobin, 9.3. Other conditions included 2
jejunal ulcers and 4 incomplete examinations.
The number of hemorrhages, the gastroscopic
findings, and the amount of gastric distress b
little if any relationship to each other. In 2
of the cases the bleeding source was not disco
by gastroscopic examination. It is suggested
that the combination of X-ray and gastroscopy
might find the bleeding source in more patient
It is concluded that gastroscopy is a good
supplement to X-ray examination.

9072 A MUCOSAL DIAPHRAGM AT THE LEVEL OF
THE PYLORIC ANTRUM IN THE ADULT. (A
ADDITIONAL CONTRIBUTION TO THE ANATOMICAL AND
CLINICAL DESCRIPTION OF THE SAME, BASED ON FOU
SURGICAL OBSERVATIONS.) (It.) Tagliacozzo, S
(U. Rome). Policlinico [Chir.] 74(2):71-99,
1967.

A review of the pathogenesis, frequency of
incidence, clinical diagnosis and treatment of
pyloric stenosis due to the presence of a diap
composed of gastric or duodenal mucosal tissue
includes a report of its occurrence in 4 men,
aged 42-57 yr., in the absence of overt clinic
symptoms or discernible anatomical changes whi
would suggest its existence. In all 4 the
diaphragm contained an orifice which permitted
the passage of food. One of 4 presented with
colic and gastroenteritis, presumably secondar
to lead poisoning of many yr. duration; 1 of 4
each with gastric and pyloric ulcer; 1 of 4, w
chronic indigestion and epigastric pain. In t
first 3 cases, formation of the diaphragm was
thought to be secondary to the presenting cond
above; in the fourth, it appeared to result fr
a torus of pyloric muscle.

ANTISTOMACH ANTIBODIES AND AGING. (Fr.)
Herbeuval, R. (Fac. Med., Nancy, France),
uheille, G. Cuny and A. Haagen. Presse Med.
5):731-735, 1967.

o 1 comprised 41 healthy persons, 22 females
age 23 1/2 yr.) and 19 males (av. age 26
. Group 2 had 108 persons more than 60 yr.
(av. age 76), 69 females and 39 males. The
ers of the second group had experienced
ous diseases and some were suffering from
nic disorders. All subjects were tested for
odies against gastric parietal cells using
indirect immunofluorescent technic of Coons.
y-globulins were separated from human serum
hromatography and inj. into rabbits; the
rescent antibodies were prepared from the
it sera. Pieces of human gastric mucosa of
d Group 0 were treated with the human serum
g tested and then with the fluorescent
ody preparation. The tests were repeated
at gastric mucosa and upon human thyroid
ue. Two males and 1 female in Group 1 were
iers of antibodies against human parietal
s, a percentage of 7.5 for the whole group
n 41). Ten men and 25 women in Group 2, a
entage of 32.4 for the whole group (35 in
, possessed these antibodies; 23 of 57
viduals with different types of anemias
f 7 with Biermer's anemia) carried antibodies
nst gastric parietal cells; 6 of 11 with
rs had antibodies. Within the groups there
no correlation between age and incidence or
ody titer. Apparently healthy individuals
positive for these antibodies. In one case
iermer's hyperchromic anemia with achlorhydria
absence of secretion of the intrinsic factor,
antibody titer was very high. In 64 sera
ned, 14 showed antibodies to both parietal
s and to thyroid gland cells, 13 had antibodies
nst gastric cells only, 21 against thyroid
s only and 16 were without antibodies against
er type of cell; 6 sera possessed an anti-
ear factor associated in 4 cases with the
ltaneous presence of antibodies against both
ric parietal and thyroid gland cells, indicat-
a profound disorder of the immunologic
esses.

INTERRELATIONSHIP BETWEEN THE MORPHO-
LOGICAL AND FUNCTIONAL CHARACTERISTICS
HE STOMACH AND OF CHOLINESTERASE DISTRIBUTION
HE GASTRIC MUCOSA WITH THE PROGRESS OF AGE
ELDERLY INDIVIDUALS). (Rus.) Donskaia, L. V.
ingrad Sanit.-Hyg. Med. Inst., USSR) and
. Smolianskii. Arkh. Pat. 29(3):46-50,
.

d on data obtained from 54 individuals (43
thy elderly persons, 60-88 yr. old, with no
ric disease; 11 young, healthy volunteers,
5 yr. old), 4 groups were found with charac-
stics which define the degree of morphological,
ochemical and functional changes of the
ach. Group 1 represents, morphologically
functionally, the normal stomach; thread-like
cholinesterase was found between the chief and parietal cells and was identified with cholinergic threads in mucosal nerves. Group 2 showed initial gastric changes which were atrophic in character; there was slight thinning of the mucous membrane, slight changes in the chief and parietal cells, moderate weakening of secretory activity (decrease in gastric juice pepsinogen from 1-2.1 g% and of free acid to 10-20 titration U), and a less-pronounced thread net, giving a positive reaction to cholinesterase. Group 3 revealed pronounced atrophic changes, thin and reduced mucosa, a reduced number of chief and parietal cells, a reduced amount of pepsinogen granules in the chief cells, replacement of parts of the glandular parenchyma by connective tissue, initial symptoms of gastric cell metaplasia, hypoacidity (0-10 titration U), a pepsinogen conc. of less than 1.0 g% and cholinesterase in the form of thin, but not interlinked, threads. Group 4 showed markedly pronounced atrophic changes of the stomach, deep dedifferentiation of the chief and parietal cells, a decrease of glands to anadenia or their reorganization into the pyloric or intestinal type, hypo- or anacidity, achylia and the absence of cholinesterase. A decrease in pepsinogen was found in 29 of 36 subjects, a hypo- and anacidic condition in 28 of 36, and enzymatic activity was absent in 34 of 43 older people. Thus, a correlation exists between the presence and character of distribution of cholinesterase in the mucous membrane and the functional and morphological characteristics of the gastric glands. Determination of cholinesterase in the gastric mucous membrane can be used as a histophysiological test which is specific for the morphological and functional peculiarities of the stomach.

9075 CEREAL CONSUMPTION AND GASTRIC CANCER. (E.) Hakama, M. (Finnish Cancer Register, Helsinki) and E. A. Saxén. Int. J. Cancer 2(3):265-268, 1967.

The most striking features in the incidence and mortality of gastric cancer are (1) the great differences between countries (the highest age adjusted mortality is about 10 times greater than the lowest) and (2) a decrease in the decade following 1950 in most countries av. about 15%. These differences are real and not due to variations in standards of diagnosis or treatment; no concurrent increases of tumors other than gastric in the gastrointestinal tract have been noted; no improvement in survival of gastric cancer patients has occurred. The incidence of gastric cancer is higher in lower socio-economic classes, in groups where starchy foods are predominant; in intercountry comparisons national standards of living are correlated with av. per capita income and these are inversely related to the incidence of gastric cancer. The decreased incidence of stomach cancer has been connected with improvement in nutrition. One common characteristic of high incidence areas has been a low consumption of fresh vegetables and fruits and a high consumption of starchy foods. Also, in recent decades the proportion of cereals in the total food consumption has decreased in most countries. If cereal consumption and incidence of gastric cancer are associated, then: (1) the consumption of cereals in countries with high incidence of stomach cancer should be higher than in those with low incidence of such neoplasms and (2) if changes in cereal consumption and changes in stomach cancer occur, although not proportionate or even in the expected direction, there may still be an interrelationship. The changes investigated were in the expected direction and the estimated coefficient of correlation was 0.75 between the variables. With proper adjustment for the latent periods between exposure to the carcinogenic agent and diagnosis of cancer (estimated 20 yr.), the 95% confidence intervals were from 0.41-0.91 and from 0.13-0.91 for age-sex adjusted mortality rates and flour consumption in 16 countries.

9076 SUMMARIZING INDICES FOR COMPARISON OF CANCER INCIDENCE DATA. (E.) Doll, R. (Univ. Coll. Hosp. Med. Sch., London) and P. Cook. Int. J. Cancer 2(3):270-279, 1967.

A method of more concisely expressing the frequencies of cancer is required. In principle, the best comparisons are those between individual sex- and age-specific incidence rates with small age groups; the difficulty with this method is that unless the observations are made on immense numbers (in the order of millions), the rates will be subject to substantial fluctuations due to chance alone. There are many different types of cancer and if 10 or 20 figures have to be kept in mind for each type for each population the task becomes intolerable. The traditional index which is still commonly used is the total incidence standardized for age; different results are obtained depending upon the particular population chosen as standard. There are 3 of these "standard populations", African, World, and European, which show distinct differences with respect to incidence and age; despite these differences, rank order of incidence in 34 different populations for stomach, lung cancer, and leukemia in men and breast cancer in women does not change much with change of population standard. The main differences and difficulties arise from differing frequencies of various specific neoplasms with respect to age, and also the actual age differences among the "standard populations"; for example, the African population is a relatively young one whereas the European (actually based on Scandinavia) is a population of higher av. age. In view of the foregoing it is concluded that: (1) No single index can replace the individual sex- and age-specific incidence rates which are basic. (2) For etiologic studies, age-specific rates can be usefully summarized in 2 indices (a truncated standardized incidence) showing a standardized incidence over a restricted age range, and the other indicating the rate at which cancer increases with age. (3) An appropriate truncated rate for most epithelial cancers for the age range 35-64 yr., using wt. of 6, 6, 6, 5, 4, and 4 for the individual 5-yr. age groups (derived from Segi's World Standard Population). For other cancers, age ranges of 0-14 yr., and of 0-44 yr. would be more suitable with wt. of 12, 10, and 9; and 12, 10, 9, 9, 8, 8, 6, 6, 6 for the corresponding 5-yr. groups. (4) An indication of the general character of a given set of incidence data may be obtained by calcul ing the ratio of the rates at 55-64 yr. and at 35-44 yr. for a combined group of cancers which normally increase rapidly in incidence with age

9077 HISTOGENESIS OF GASTRIC CARCINOMA. (Rus.) Vasilenko, I. V. (Donets Med. Inst., USSR). Arkh. Pat. 29(3):31-36, 1967.

In a study on 62 stomachs with cancerous tumors 2 histogenetic types of carcinoma of the stomac were found: Group 1, cancer originating from mucoid cells of the gastric fossa region and th cervix of stomach glands; and Group 2, cancer originating from intestinal epithelium which developed in the stomach as a result of metapla Cancer from mucoid cells had an undifferentiate micro- and polymorphocellular histological stru ture, with a larger amount of mucoid granules i the cytoplasm and in individual cricoid cells. Cancer from intestinal epithelium was character by a glandular structure (with large glands), a high and cylindrical epithelium, large and hype chromic nuclei, the absence of secretion and by the presence of goblet cells; in rare cases of collodial cancer, its origin from glandular can was clearly evident. In Group 1, the av. age of patients was 47 yr.; in Group 2, 58 yr. In Group 2, exophytic tumor growth in the form of nodules or ulcers with spindle-forming ends was evident; in Group 1, in 1 case there was a flat nodule with clear ends, while the remaining tum was infiltrative in form. All of the cancers i Group 2 had a small-moderate content of stroma and no scirrhus, while in Group 1, 16 had a scirrhous character and 4 had a moderate amount of stroma. Cancer cells from Group 2 had a hig content of RNA, while cells from Group 1 cancer usually had a low-moderate amount of RNA. In Group 2, intestinal metaplasia was highly pronounced in 11 and moderately pronounced in 10; in Group 1, highly-pronounced intestinal metaplasia was found in 1 case, a moderately-pronounced metaplasia in 9, and a slight-absent amount of metaplasia in the remaining cases. Marked differences of these 2 types of cancer are conditioned by their different histogenesis

9078 THE COURSE OF GASTRIC EPITHELIOMA IN RELATION TO HISTOLOGY. (Fr.) Razem P. (City Hosp., Lille, France) and C. Gautier-Benoit. Ann. Chir. 21(3-4):154-159, 1967.

Of 830 stomach tumors, 489 were classified histologically; 470 of these were epitheliomas of various types (differentiated or glandular

fferentiated or trabecular 62; linitis 62;
id 43; Lieberkuhn Type 2). Malignant ulcers
present in 18 cases. The lower, middle and
r portion of the stomach was involved in 254,
and 90 cases, resp.; the entire stomach was
lved in 30 cases. Differentiated epithelioma
malignant ulcers were more frequent in the
r portion of the stomach (64.67% and 68.41%,
., of cases); the other tumor types showed
pprox. equal distribution. Perforation was
most frequent in patients with mucoid epi-
iomas (3 cases = 6.97%); hemorrhage was more
uent in patients with undifferentiated (7
s = 11.28%) and mucoid epitheliomas (4
s = 9.3%). Lymph node invasion was most
uent in patients with mucoid tumors (71%) and
t frequent in the presence of malignant ulcer
); local invasion was present in 20-21% of
patients with mucoid or differentiated tumors,
ared to 10-12% of patients with tumors of
r types. Metastases were most frequent in
ents with mucoid or undifferentiated tumors
and 16%, resp.) and least frequent in cases
initis (5%). The growth rates of these
rs appeared to be about the same, however.
ignificant age differences were noted. The
. survival rates in patients with malignant
rs, linitis, differentiated or undifferentiated
helioma, and mucoid epithelioma were 36%,
19%, 17%, and 12%, resp. Analysis of sur-
l rates according to the stage of disease
) was not possible in several groups because
were too small for statistical evaluation,
the av. survival time in 52 patients with
e 3-5 disease undergoing laparotomy only was
r 5 mo. regardless of tumor type. Following
gastrectomy, best results were seen in patients
Stage 2 differentiated or undifferentiated
helioma (av. survival times were 83 and 57
resp.). The av. survival time in patients
mucoid epithelioma or linitis was better
owing 80% gastrectomy (44.6 and 36.5 mo.,
., in Stage 3) than after 67% gastrectomy
7 and 3.7 mo., resp., in Stage 1). Total
rectomy (performed of necessity or as a
entive measure) gave best results in patients
differentaited epithelioma, especially in
e 2; in the other groups, av. survival times
about the same as after partial gastrectomy.
nectomy worsened the prognosis of 80%
rectomy in all patients except those with
tis. Chemotherapy with 5-fluorouracil (750-
mg/day i.v. to leukopenia) or cyclophosphamide
some cases) in a single postoperative course
not seem to modify the evolution of the
ase after 67% or 80% gastrectomy in any tumor
.

THE VALUE OF LACTIC OXIDOREDUCTASE
ACTIVITY DETERMINATION IN THE GASTRIC
ENTS AFTER HISTAMINE STIMULATION IN THE
NOSIS OF GASTRIC CANCER. (Pol.) Cieślińska,
lst Inst. Intern. Dis., Acad. Med., Szczecin,
nd). Wiad. Lek. 19(19):1539-1542, 1966.

6 controls the L-lactic acid oxidoreductase activity in the gastric content was 0.6-22.1 U with a mean of 6.2 U; in the serum 5.5-11.5 with a mean of 8.5 U. In 20 duodenal ulcer patients: gastric contents 2.8-20.6 U, mean 9.1 U; in serum 3.3-11 U, mean 6.9 U. In 20 gastric ulcer patients: in gastric content 1-42.4 U, mean 10.2 U; in serum 0-15 U, mean 7.5 U. For 16 gastric carcinoma patients: in gastric content 0-161 U, mean 23.9 U (patients with high activity showed widespread neoplastic changes, mainly adenocarcinoma); in serum 5.7-25 U, mean of 10.2 U. In the control group the mean values of activity were higher in the serum than in the gastric content, while this situation was reversed in patients with duodenal ulcers, gastric ulcers and gastric carcinoma. The mean activity of this enzyme in patients with gastric carcinoma surpassed the values obtained in patients with gastric or duodenal ulcers. However, no distinct differences were seen between the number of patients with high enzyme activity in the carcinoma group when compared to the ther groups. It is therefore concluded that L-lactic acid oxidoreductase determination cannot be used for differential diagnosis of gastric carcinoma and gastric ulcer.

9080 TREATMENT OF DUMPING SYNDROME WITH SEROTONIN ANTAGONISTS. CLINICAL OBSERVATIONS. (It.) Camarri, E. (U. Siena, Italy), G. P. Bassi and P. F. Bayeli. Gazz. Med. Ital. 126(3):91-96, 1967.

N-Carbobenzyloxy-1-methyldihydro-L-lysergamine (FI 6337) was admin. p.o. (total dose 24-1380 mg) to 24 patients (21 men and 3 women; age 28-74 yr.) with postgastrectomy dumping syndrome. Gastrectomy (Billroth II) had been performed 1-17 yr. (av. 6.3 yr.) previously. Results were classified as excellent in 10 patients (41.6%), good in 8 (33.4%), slight in 3 (13.5%), and poor in 3 (13.5%). Among the symptoms which showed improvement following FI 6337 therapy were epigastric wt., abdominal discomfort, vomiting, diarrhea, yawning, aerogastria, sleepiness, headache, and cyanosis of the upper extremities. No side effects were observed in 20 of 24 (83.3%) patients; others showed paresthesia (3), precordial pain and hypotension (1), or hypotension with tachycardia and fainting (1); treatment was suspended in 1 patient. In 15 patients in whom dumping syndrome had been induced experimentally (100 g of glucose in 500 ml H_2O p.o.), the i.m. admin. of FI 6337 (2-4 mg) caused marked (2) or good (6) regression of symptoms, slight improvement (2), no change (4), or worsening (1). Hematocrit, blood sugar, and blood K values did not change significantly in patients with experimentally-induced dumping syndrome. The results confirm that serotonin is one of the major humoral factors responsible for postgastrectomy dumping syndrome. However, the failure of some patients to respond to serotonin antagonists indicates that not all postprandial disturbances following gastrectomy are due to the release of serotonin.

9081 ALTERATION OF THE EXCRETORY FUNCTION OF THE PANCREAS AFTER JEJUNOGASTROPLASTY (REDUODENIZATION) IN THE DUMPING SYNDROME.

(Rus.) Volobuev, N. N. (Crimea Med. Inst., Simferopol, USSR). Khirurgiia (Moskva) 43(3):52-56, 1967.

During 1959-1965, jejunogastroplasty was performed on 80 patients (65 men, 15 women; from less than 30 to over 60-yr. of age) with severe dumping syndrome which had developed immediately or 20 yr. after resection for gastric or duodenal ulcers (in 75), gastric polyposis (in 4) or gastric carcinoma (in 1). Only 1 of 80 died due to faulty sutures of the interintestinal anastomosis. Of 72 observed for 6 mo.-5 yr. after jejunogastroplasty, the dumping syndrome disappeared immediately or at various periods after surgery in 66, with no improvement occurring in 6. Of 59 studied before jejunogastroplasty, a normal conc. of enzymes in the intestinal juice was found in 1 and a decreased amount in 6; normal variants of secretion curves were found in 5, abnormal function of the pancreas in 47, disturbed separation of trypsin in 41, of lipase in 35, of amylase in 11 and a high amylase conc. in 39; creatorrhea occurred in 40, steatorrhea in 32, amylorrhea in 16 and the content of fat in the feces av. 17.6%. After jejunogastroplasty (3 mo.-5 yr.) all 50 subjects showed improvement and even normalization of the indices of pancreatic secretion; 41 had normal variations of dynamic secretion curves, 8 had an abnormal function of the pancreas and a normal coprogram was found in 50 of 54 subjects studied; the content of fat in the feces av. 5.4%, and moderate digestive disturbances were found in 4. Only 1 patient had an exacerbation of pancreatic secretion, after a period of improvement. A wt. increase of less than 5-34 kg after jejunogastroplasty was noted in 66. Improvement was dependent upon the length of time since reconstructive surgery. One case history is presented in detail.

9082 CHANGES IN ABDOMINAL ORGANS IN THE DUMPING SYNDROME.

(Rus.) Samokhvalov, V. I. (Milit. Med. Acad., Leningrad, USSR) and S. A. Kalashnikov. Klin. Med. (Moskva) 45(2):31-35, 1967.

A total of 125 patients had gastric surgery 1-10 yr. previously for gastric or duodenal ulcers (102) or polyposis or cancer (23); of this total, 49 had reconstructive surgery for severe dumping syndrome, 24 for afferent loop syndrome, 24 for peptic ulcer, 4 for postsurgical alimentary dystrophy and 24 for severe postoperative disturbances (biliary, gastric, duodenal and pancreatic fistulas, gastric and duodenal-stump tumors and gastrointestinal bleeding of unknown causation). A diffuse enlargement and induration of the liver was found in 4, pronounced liver cirrhosis in 1, enlarged liver in 2 and dense liver in 1. Biopsy material showed no morphological changes in 32 of the 62 studied; 8 showed slight edema of the periportal layers with circular sclerosis of the bile-duct walls; 17 exhibited edema of the periportal layer with lymphoid-ce lar infiltration, while 5 had inflammatory in tration of the liver stroma. A similar histo picture of liver structure appeared in the co group (22 patients with laparotomy for variou diseases of the abdominal organs). There was increase in the frequency of liver cirrhosis to the passage of time after a Billroth II gastrectomy. There was no basic difference i the frequency of changes associated with the various types of postoperative disturbances, no specific histochemical changes were eviden in the livers of patients with various types postsurgical disturbances. There was an incr frequency for tense or atonic gallbladder in patients with dumping syndrome, and especiall in those with inlet loop syndrome, more than those with other types of disturbances. Incr induration of the pancreas in patients with p operative disturbances could not be demonstra The duodenum and afferent loop in most of the patients had decreased tonus and atrophic wal while changes in the efferent loop were more pronounced. Such changes were found in those patients with the dumping syndrome and the afferent loop syndrome. There were no cases jejunitis. These changes in the small intest reflect a compensatory process occurring in t intestine in response to altered conditions o digestion after gastrectomy.

9083 THE ROLE OF HEPATOPANCREATODUODENAL SECRETION IN THE PATHOGENESIS OF TH DUMPING SYNDROME.

(Rus.) Markin, S. P. (Cen Inst. Postgrad. Med., Moscow) and I. V. Ognev Klin. Med. (Moskva) 45(2):49-57, 1967.

Various studies were conducted on 22 patients (16 men, 6 women; av. age 40 yr.) who had und gone (av. 3.8 yr. previously) a Billroth II gastrectomy; studies included laboratory, cli X-ray tests as well as stimulation of secreti from the hepatopancreaticoduodenal complex an excretion of enzymes by the pancreas. These patients exhibited 3 forms of the dumping syn Group 1, 7 patients, a severe or decompensate form; Group 2, 8 patients, a moderately sever or subcompensated form; and Group 3, 7 patien with a mild or compensated form. In Group 1 patients, dumping syndrome seizures developed not only after feeding of carbohydrates and milk, but also after an excess of liquid food (cold or warm). In Group 2, dumping syn seizures occurred after feeding with easily assimilated carbohydrates and neutral fats. Group 3, dumping syndrome seizures rarely occ this group exhibited a high sensitivity towar milk, which caused dumping syndrome seizures. In all 22 of the patients, the dumping syndro had already developed during the early postop tive period. In patients who developed the dumping syndrome after a Billroth II gastrect the processes of gastric juice and enzyme sec tion after the admin. of stimulants (hyperton soln. of glucose, milk, fats) were markedly disturbed when compared to those of controls

ch comprised 11 healthy persons). Stimulation
nese processes during the first hr. of observa-
was followed by a rapid exhaustion of secre-
ability; a latent period was lacking, the
ific activity of most of the enzymes was
eased on an empty stomach and changes were
ific for each group. In Group 2, exocrine
vity of the pancreas was increased and the
ion to enzyme secretion was markedly labile,
apparently indicated an increased excita-
y of the secretory apparatus of the pancreas.
. of stimulants caused a significant decrease
ylolytic activity during the initial period
servation, which probably explains the
ity of the form of dumping syndrome which
induced by glucose. In Group 3, the quality
absolute amount of juice and enzymatic secre-
differed little from that in the controls;
an increased secretion of lipolytic enzymes
rred after admin. of stimulants in the patients
his group. Thus, in the dumping syndrome which
ows a Billroth II gastrectomy, depending upon
clinical picture and the duration of the
operative course, disturbance of the exocrine
vity of the hepatopancreaticoduodenal system
rred, which is largely connected with the
rity of the symptoms of the postoperative
romes.

THE MORPHOLOGICAL PICTURE OF THE JEJUNAL
MUCOUS MEMBRANE AFTER BILLROTH-II
ATION. (Rus.) Salupere, V. P. (Tartu U.
., USSR). Khirurgiia (Moskva) 43(3):57-61,
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histological state of the jejunum was studied
0 patients (21 women, 19 men; 20-60 yr. old)
had undergone a Billroth II gastrectomy 14
-10 yr. previously for gastric ulcers (10),
enal ulcer (18) and gastric tumors (12). A
nal biopsy was obtained from 40 of the patients,
a biopsy of the mucous membrane of the gastric
p from 20 of the 40 patients. A normal jejunal
us membrane was found in 31 patients, and 9
bited villous atrophy of the jejunal mucous
rane; in 6 of the latter the changes were
ht and were initially expressed by a decrease
he amount of villi. The thickness of the
us membrane in villous atrophy was 623 μ,
that of normal mucous membrane was 788 μ;
ver, this difference was not a reliable index.
illous atrophy the correlation of villi to the
dual mucous membrane was 2.8:1, and in
als it was 3.9:1; this difference was
fied. The composition of cellular infiltra-
in villous atrophy was as follows: lympho-
s, 637; neutrophils, 5; eosinophils, 41;
ma cells, 304 and mast cells, 13; the respec-
values for normal mucous membrane were 689,
0, 195 and 41. The difference between normal
atrophic mucous membrane was verified only
plasma and mast cells. In 20 patients who
both a gastric and a jejunal biopsy, the
us membrane of the gastric stump was atrophic
9 of 20, while the mucous membrane of the
num was normal in 15 of 20. The length of postoperative recovery had no effect on the structure of the jejunal mucous membrane. The arrangement of mucopolysaccharides in normal and atrophic mucous membrane was identical. Therefore, the protective qualities of the mucopolysaccharide components of the jejunal mucous membrane may be one of the factors which conditions preservation of normal structure of the jejunal mucous membrane for a long period after surgery.

9085 CLINICO-MORPHOLOGICAL INVESTIGATIONS IN PATIENTS AT REMOTE PERIODS AFTER REPAIR OF THE STOMACH WITH AN INTESTINAL GRAFT. (Rus.) Androsov, P. I. (Surg. Clin., Acad. Med. Sci., Moscow), A. M. Akimov, V. V. Balashova and A. M. Suslov. Khirurgiia (Moskva) 43(3):61-69, 1967.

A total of 61 patients (40 men, 21 women; 36-62 yr. old) were gastrectomized (total gastrectomy in 30, total-subtotal in 22 and subtotal in 9) for gastric cancer (51), benign gastric neoplasms (2), cicatricial gastric stenosis after acid burn (1) and gastroduodenal ulcers (7). A gastric prosthesis was formed in these by transplant of the large intestine (28) or small intestine (33); endoscopic examination was performed on 12 patients and morphologic studies of the intestinal transplant made on 18, both at periods of 4 mo.-9.5 yr. after operation. During the early postoperative period, endoscopic studies revealed inflammatory changes on the superficial mucous membrane of the anastomosis and intestinal transplant; during later periods, atrophy of the mucous membrane of the transplant and gastric stump, and individual examples of functional-morphological reorganization, were noted. During a long postoperative period in the small-intestine transplant, the amount of mucus on the mucous membrane surface was decreased, the latter had a dry appearance; and the amount of mucus in the large-intestine transplant increased. Morphological examination of the small-intestinal transplant in 8 patients revealed progressive atrophy of the mucous membrane with stromatic fibrosis and deformation, and various-sized villi; in addition, there were massive round-cellular infiltrations with a large amount of plasma cells, and in some cases, lymphoid folliculi with light centers of multiplication observed among such infiltrations. Venous stasis occurred plus a progressive decrease of mucus-forming (goblet) cells, especially in the apical portions. Study of the large-intestinal transplant in 7 patients showed increasing fibrosis of the submucous layer, decrease of lymphoid follicules and hyperfunction of the mucus-forming cells; the latter increased in proportion to the length of the postoperative period. At later periods, there was a massive layer of mucus on the surface of the transplant, and mucous degeneration of the large-intestinal glands. The gastric stump in 3 patients showed progressive atrophy of the mucous membrane of the cardia and a decrease in the number of glands; there were round-cell infiltrates, with eosinophils and plasma cells, in the stroma; also noted were fibrous submucous layers with dense round-cell infiltrates and venous hyperemia, and antralization of the mucous membrane. A general clinical study was made on 42 patients 15 days-9.5 yr. after surgery; in the early (up to 3 wk.) postoperative period there mild symptoms of dyspepsia, decreased tonus of the small-intestinal transplant, frequent, irregular segmental and pronounced pendular movements. Motor function of the large-intestinal transplant was characterized by slow peristaltic contractions of small amplitude. Long-term studies revealed utilization of reservoir, motor and evacuation functions by both types of intestinal transplant. In patients gastrectomized for cancer, hemopoiesis and serum proteins were somewhat decreased while all biochemical indices were normal in patients gastrectomized for ulcers. In cancer patients, postoperative wt. increase av. 5-7 kg, and in ulcer patients, it was 10-15 kg. Subjective clinical improvement occurred in patients with large-intestinal transplants. The amount of mucus in small-intestinal transplants was significantly lower than in large-intestinal transplants. After total and subtotal-total gastrectomy, the free and bound acid was zero, and total acidity 8-10. Only during the early postoperative period did the coprogram reveal a slight decrease in fat digestion.

9086 LATE POSTPRANDIAL HYPOGLYCEMIA OF THE GASTRECTOMIZED PATIENT AND THE PERIPHERAL UTILIZATION OF GLUCOSE.

(Fr.) Longueville, J. (St. Pierre U. Clin., Louvain, Belgium), J. De Plaen, R. Vlassembrouck and R. De Meyer. Acta Gastroent. Belg. 30(3):185-208, 1967.

Of 51 patients (5 women), 29 were gastrectomized. Of the latter, 12 had the typical dumping syndrome; 6 (less than 120 mg% glucose) had an atypical syndrome which could be provoked by oral loading resulting in hyperglycemia and dumping 90 min. later; 11 other gastrectomized patients were diabetics (more than 120 mg% glucose) having the same type of dumping 90 min. after provocation. Among 11 cases with gastroduodenal ulcers 5 were diabetic; 6 patients had spontaneous hypoglycemia; 6 patients were normal with respect to carbohydrate metabolism. In the analyses, oral and i.v. tolerance tests were used as well as a tolerance test with i.v. glucose after stimulation of release of insulin by oral intake of glucose. After various tests it is concluded that gastrectomy caused changes in the body wt., the surface area of the body, and the glucose space, and in the relationships among these factors which made the gastrectomized patients abnormal. The gastrectomized patients fell into 3 groups. Those who had late postprandial hypoglycemia had a normal glucose assimilation, fasting as well as after oral glucose intake; the fasting glycogenolysis was increased. The diabetic gastrectomized patients showed reduced glucose assimilation in all conditions; fasting glycogenolysis was also reduced. Those with hypoglycemia, free of the dumping syndrome, had a diminished glucose assimilation fasting and after oral glucose loading; glycogenolysis was normal under fast conditions. Gastrectomized patients whose ch difficulty was hypoglycemia did not release excess amounts of insulin as occurred in spon neous hypoglycemia. Patients with peptic ulc showed 2 different patterns: Those who were diabetic had a decreased glucose assimilation with increased fasting blood sugar levels. T were those whose fasting glucose assimilation fasting glycogenolysis and glucose space were increased while their body wt. and surface ar decreased; glucose assimilation after ingesti of glucose was only slightly increased.

9087 STUDY OF THE GASTRIC STUMP: COMPAR OF GASTROSCOPIC, BIOPSY AND RADIOLO EXAMINATIONS.

(It.) Saracco, C. (U. Turin, Italy), F. Balzola and V. Lombardo. Minerva Gastroent. 12(4):141-145, 1966.

Among 105 men and 15 women developing renewed gastrointestinal symptoms 4 mo.-24 yr. after gastric resection, 90 had been operated upon duodenal ulcer, 15 for gastric ulcer, 14 in t absence of confirmable diagnosis and 1 in the presence of a gastric neoplasm. The age rang at the time of surgery was 24-63 yr., with ma incidence in the third decade of life. Sympt responsible for renewed consultation included epigastric distress (84 cases), wt. loss (50) hemorrhage (36), asthenia (34), vomiting (30) anorexia (31), heartburn (26), diarrhea (12) dumping syndrome (5). A table is presented o X-ray and gastroscopic diagnoses, plus the nu of cases in which these agreed, as follows: normal = 36, 31 and 10, resp.; gastritis, sto tis or jejunitis = 18, 53 and 4, resp.; ulcer tion of the gastric stump = 20, 6 and 4, resp suspected ulceration = 14, 0 and 0, resp.; ca of the stump = 2, 11 and 1, resp.; suspected cancer = 7, 0 and 0, resp.; perivisceritis = 6 and 3, resp.; jejunal ulcer = 1, 0 and 0, r operative artifacts = 0, 6 and 0, resp.; othe 10, 7 and 0, resp. Among 59 patients who als underwent biopsy of the mucosa of the gastric stump, biopsy confirmed X-ray findings in 50% of the cases; confirmed gastroscopic findings in 66%. Among the total of 120 patients, pat logical changes involving the gastric stump w confirmed in 93.5% of the group, but changes demonstrable by 2 or more methods in only 34% It is concluded that all 3 methods should be employed whenever possible.

9088 EFFECTS OF EXPOSURE, FREEZING, AND RADIATION ON EXPLANTED GASTRIC MUCO

(E.) Harata, N. (U. Chicago, Ill.), C. Vokin and D. J. Ferguson. Amer. J. Dig. Dis. 12(7) 674-684, 1967.

Canine (fundic) gastric mucosa was explanted onto the abdominal wall in 3 vascularized pie each approx. 3 cm in diameter; some explants covered with plastic or skin, and others rema

osed. Explants which were covered with skin
ained nearly normal histologic features and
reted acid. Explants covered with plastic
e less well preserved, and those without cover
t all parietal and chief cells. Parietal cells
ppeared in undifferentiated mucosa approx.
k. after recovering the explant. All explants
ntained a healthy-appearing mucosa. Removal of
stic covers was followed within 6 hr. by loss
acid-secretory function, possibly as a result
lowered temperature. Measured freezing of 1
lant and irradiation of another were compared
h controls in the same dogs, with and without
n cover; ulcers were made with a punch, and
ling time was noted. Acid secretion in response
histamine was measured qualitatively. Both
adiation and freezing temporarily eliminated
d secretion and produced long-lasting changes
the mucosa; ulcer healing time was increased.

9 LABELLED FLUOROBORATE IN THE STOMACH
OF RATS. (E.) Matthews, C. M. E.
mmersmith Hosp., London). Nature (London)
(5091):933-935, 1967.

rier-free ^{18}fluoroborate, dissolved in saline,
inj. i.v. into rats. Some received 4.8 mg
chlorate i.p. 20 min. before inj. of label;
e received carrier fluoroborate. Rats were
led at intervals after inj., and organs were
oved, weighed and counted. Tumors were RIB5
SBS1 fibrosarcomas previously implanted s.c.
the flank. Conc. of label in most organs
alleled the body av., but were higher in the
mach. Perchlorate reduced uptake, but addition
carrier fluoroborate had no further effect.
rier fluoroborate without perchlorate also
uced uptake, but a higher conc. was required
give the same degree of reduction as with
chlorate alone: 2.3 mg of carrier reduced
ake at 1 hr. to 60% of that for carrier-free
erial; 5 mg carrier reduced it to 30%. It is
gested that fluoroborate is conc. in the stomach
the same way as iodide. Perchlorate had no
nificant effect on conc. in tumors and brain
tumor/brain ratio. Expected radiation doses
ds/mc) to humans were: gonads, male 0.060,
ale 0.071; stomach 0.57; av. whole body 0.048.
mach uptake increased linearly with time up to
r. and remained constant. It is concluded
t labeled fluoroborate is not as useful for
in scanning as was suggested, but it still
pares favorably with the other position emitters.
earlier estimate of 13.3 for the A factor is
uced to 10.9, assuming perchlorate will be
en and will produce the same blockage of uptake
human stomachs as in rats. The use of carrier-
e fluoroborate for stomach scanning is sug-
ted.

0 SURVIVAL IN RATS AFTER GASTRECTOMY OR
GASTRIC BYPASS. (Fr.) Lambert, R.
ouard Herriot Hosp., Lyon, France), F. Martin
F. Descos. Arch. Franc. Mal. Appar. Dig.
3):141-162, 1967.

To determine whether the mere presence of the stomach indirectly influences nutrition by means of its vascular connections, the effect of gastrectomy and gastric bypass was studied in rats; correcting the nutritional deficiency following this surgery was also studied. A total of 379 white rats were divided into 3 groups: a) 54 males as control; b) 105 males with total gastrectomy, subdivided into treated and untreated groups; c) 65 females and 155 males both with gastric bypass, also subdivided into treated and untreated groups. Even though the bypass seemed to be less mutilating and better tolerated, both surgical procedures led to superinfection. After esophagojejunostomy, lifespan was shortened, very few rats surviving 12 mo.; preoperative wt. was not regained; anemia occurred from the third mo. on (dropping from the normal 10 million ml^3 to between 6-7 million). After esophagoduodenostomy, tolerance was better for 6 mo., with more survivors; the postoperative wt. slightly exceeded the preoperative, anemia was less, but after 6 mo. the condition worsened. After gastric bypass, the results were comparable with those after gastrectomy. It was noted, however, that the females tolerated the intervention better, especially with respect to wt. Results of treatment to counteract physiopathologic sequelae were similar in both gastrectomized rats and in those with a gastric bypass, although the correction of just one of the pathologic effects improved the gastrectomized animal only temporarily, but led to more improvement in the animal with the bypass. It is concluded that there was no evidence for any indirect activity of the stomach contributing to nutrition through its vascular connections.

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DIAGNOSTIC POTENTIAL OF ENDOGASTRIC
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See also abstract nos.: 8690,8760,8811,8812,9220,9379,9686

9138 USE OF AN ANTIPERISTALTIC COLONIC SEGMENT INTERPOSITION TO REDUCE SMALL INTESTINE MOTILITY FOLLOWING EXTENSIVE RESECTION. (A PRELIMINARY COMMUNICATION). (Fr.) Vayre, P. (Vaugirard Hosp., Paris), J. Hureau and R. Soyer. Ann. Chir. 21(9-10):521-526, 1967.

Antiperistaltic interpositions were tried in dogs in order to retain the contents in the small intestinal segment for periods sufficient for absorption through the reduced surface area. The dogs were given supportive treatment for 1 wk. prior to surgery including admin. of antibiotics; during operation they received i.v. glucose. The first type of colonic interposition was the right oblique angle jejuno-colic in reverse direction (antiperistaltic) with retention of the ileocecal valve; the other anastomoses in this type were colo-ileal and colo-colic. The second type was like the first with removal of the ileocecal valve and an anastomosis on the anterior face of the cecum. The third type utilized the ceco-appendicular region rotated 180° with jejuno-cecal and appendiculo-colic anastomoses. Control dogs underwent corresponding enterectomy only. Twelve of the first type, the colonic transplant, were prepared; 3 died in a few days, 1 from hemorrhage and 2 with a broncho-pulmonary syndrome. The remaining 9 animals survived and were kept under observation for 4-6 mo. Postoperatively there were 3 stages. During the first 8 or 10 days the animals were asthenic and anorexic with abundant soft stools; in the next 5-6 days the dogs underwent a period of adaptation with more normal digestion and less disturbed transit; the stools, 5-6/day remained soft. At the end of 1 mo. the animals were in good condition having regained their original wt. and vigor. The stools of 4 were completely normal; those of the others remained somewhat soft. The blood picture was entirely normal in all components. The progress of contrast medium was followed; radioisotope studies of protein and fat metabolism were made and were normal. The control animals lived for a wk. on the av.; they would not accept food and drank great quantities of water, and died of cachexia and profuse diarrhea. It is concluded that interference with the ileocecal valve has serious consequences, especially with subtotal enterectomies.

9139 EVALUATION OF THE EXCHANGEABLE POTASSIUM POOL AFTER ILEOSTOMY. (EXPERIMENTAL STUDY.) (It.) Balzola, F. (U. Turin, Italy), S. Lamarca, G. Giribone, A. Mussa and A. Pera. Minerva Gastroent. 12(4):127-129, 1966.

In rabbits (approx. wt. 2 kg at the start of the experiment) and subjected to ileostomy, inj. of ^{42}K (60 c, i.v., 18-72 hr. after surgery) was followed by determinations of 12- and 24-hr. urinary excretions of the isotope and estimations of the available pool of exchangeable K. Only 19 of 60 animals survived to the fourth day; none survived to the fifth. Among 5 of the 19 operated animals which survived to day 4, the estimated pool of exchangeable K on the third day ranged from 49-102 U/kg.; among 5 controls it ranged from 110-197 U/kg. Among 14 of 41 operated animals which died within 48 hr., the estimated pool on the first day ranged from 41-122 U/kg, as compared to 163-290 U/kg among 10 controls. No tabulations are given for the remaining animals among either the short-term relatively long-term survivors of surgery. It is concluded that the electrolyte deficit whic followed ileostomy became irreversible in a ve short time, in the absence of substitution therapy, thus precluding the animals' survival

9140 COMPARATIVE STRENGTH OF INVERTED, EVERTED, AND END-ON INTESTINAL ANASTOMOSES. (E.) Loeb, M. J. (Minneapolis Veterans Hosp., Minn.). Surg. Gynec. Obstet. 125(2):301-304, 1967.

Anastomoses (4) were performed on mongrel dogs 2 in the jejunum just beyond the ligament of Treitz and 2 in the ileum approx. 6 inches fr the cecum. Four groups of 7 dogs each were tested as follows: Group 1, everted vs. inver anastomosis (sacrifice and testing performed the third postoperative day); Group 2, everte vs. inverted anastomosis (sacrifice and testin on the seventh postoperative day); Group 3, inverted vs. end-on anastomosis; and Group 4, end-on single layer vs. inverted 2-layer anastomosis tested at 3 days. No dogs died from leakage of the anastomosis. At 3 days, mean bursting force of the jejunal inverted anastomosis was 4.20±1.7 dynes/cm compared to 1.41±0.84 for jejunal everted anastomosis. T inverted ileal anastomosis was similarly stro 2.73±1.43 dynes/cm vs. 1.82±1.27 dynes/cm for the everted. At 7 days postoperatively, inverted anastomosis was again superior, 5.08±1. dynes/cm vs. 3.22±2.02 dynes/cm in the jejunu and 4.95±2.37 dynes/cm vs. 2.94±2.20 dynes/cm the ileum. In the jejunum, inverted anastomos av. 2.46±1.67 dynes/cm while end-on av. 2.25± dynes/cm; in the ileum, inverted anastomoses 1.78±0.88 dynes/cm and end-on anastomoses 1.52±0.78. Comparison between end-on anastom and stardard 2-layer inverted anastomoses sho that in the jejunum, the mean bursting force 2±1.37 dynes/cm for the end-on anastomoses an 3.37±1.13 dynes/cm for the 2-layer inverted anastomoses. The ileal anastomoses av. 1.09± dynes/cm for the end-on and 2.32±0.91 dynes/c with inverted 2-layer anastomoses. Thus, the strongest union proved to be the standard 2-layer inverted technic. One-layer inverted end-on anastomoses, although slightly weaker, were satisfactory because of ease of technic, less compromise of blood supply, and a larger lumen at the site of anastomosis. No significant difference was noted between the 1-layer inverted and end-on method. Everted anastomos

weakest and, although feasible, are not
ommended for general use.

SEGMENTAL SURGERY OF THE TERMINAL ILEUM OR THE RIGHT COLON FOR BENIGN LESIONS.

) Popesco-Urlueni, M. *Lyon Chir*. 63(3):
373, 1967.

ctions of the terminal ileum were done for a
er of different reasons; occlusion, intussus-
ion, stenosis, etc. Where complete tran-
ion was necessary, in 2 cases the continuity
he intestine was re-established by end-to-end
l anastomoses and 5 times by ileocecal end-
ide anastomoses. Ten resections of the
cecal ascending regions were accomplished for
ulus, tumor, etc. Continuity was re-established
leo-ascending cecal anastomosis or end-to-end
tomosis. One resection of the ascending
m and 2 resections of the hepatic angle were
owed by re-establishment of continuity by
to-end cecocolostomy, called transplantation
he cecum. The physiological considerations
a conservative surgical technic were:
ntion of a max. absorptive surface and retention
he ileocolic sphincter when possible for
ongation of time of intestinal content in
m and for one-way valvular action preventing
rgitation of materials into the ileum from
large intestine. The anatomical considera-
s were physiological also and concerned the
rruption of the extensive vascular bed dur-
extirpation of large segments in the ileo-
l region. Technic also chiefly concerned
ervation of vascularization. Success was
eved in 39 cases.

INFLUENCE OF JAUNDICE ON THE SMALL INTESTINAL MUCOSA.

(Ger.) Ihász, M.
Budapest, Hungary), J. Füsy, T. Jakab and
éfi. *Zbl. Chir*. 92(8):269-273, 1967.

dogs (12-15 kg), fasted for 24 hr. were
rotomized, and an intestinal loop 20 cm-long
ved from the region of the duodenojejunal
ure; the loop was mobilized with its blood
ly intact so that the mucosa could be
rved under a binocular dissecting scope at a
ification of 32. To be certain of the
ct of jaundice upon the intestinal mucosa,
ficial jaundice was produced by bile duct
tion. In other dogs an ileostomy was con-
cted from a blind loop about 20 cm proximal
he ileocecal junction so that the mucosa,
red with a transparent plastic cap and
red in place, could be examined under the
ecting microscope over a period of 10-14
. Contininuity of the intestine was re-
ed by end-to-end anastomosis. The degree of
dice was determined by serum bilirubin levels.
ore dogs with ileostomies, sodium taurocholate,
ocholate, or dehydrocholate was inj. The
rubin serum level was 0.26-0.40 mg% prior
peration in 7 dogs with subsequent bile duct
ligation; after 2 days the serum bilirubin level rose to 1.2 mg%; daily examination of the mucosa revealed no motility of the villi during the first 2 days, not even after mechanical irritation; the mucosa was edematous and hyperemic. Villi movement began on the third day and during hunger showed 60-150 contractions/min. as the edema and hyperemia decreased; rate of contraction increased upon mechanical irritation; at this stage the av. serum bilirubin conc. was 2 mg%; on the fifth day motility of the villi ceased as the bilirubin conc. reached 4.5 mg%, edema of the mucosa disappeared, motility of the villi did not return; serum bilirubin levels continued to rise until death of the animal within 2 wk. of bile duct ligation. The bile salts were inj to see if these compounds were the cause of the effects observed. The taurocholate, glycocholate and deoxycholate all showed the same effects (at different conc.). Inj. of 2 ml of 0.1% glycocholate caused sudden activity of the villi lasting about 1 min. then ceasing after the second min; the muscle of the villi relaxed; capillaries dilated and intestinal peristalsis decreased. These effects could be elicited from a conc. of glycocholate of 0.001%; taurocholate conc. were 0.05-0.01%; dehydrocholate required a conc. of 1% to be effective. Gallbladder bile produced the same results. The dog does not synthesize glycocholate.

9143 DUODENO-JEJUNITIS AND SIDEREMIA. PRELIMINARY STUDY.

(Fr.) Debray, C. (Bichat Inst., Paris), D. Cattan and C. Marche. *Nouv. Rev. Franc. Hemat*. 7(2):301-309, 1967.

Patients (23) with duodenojejunitis of various etiologies, were grouped as follows: Total atrophy of the villi in 8 cases; 3, of which had intolerance to gluten; 5, undetermined causes; subtotal atrophy of the villi in 2 cases, 1 with lack of γ-A-globulin in both serum and saliva, 1 of undeterminate cause; a tendency to villous atrophy, 9 cases, decreased height of villi; atrophy spots; 1 with deficient γ-globulins, 1, visceral neuropathic diabetes, 1, infectious duodenojejunitis, 1 with *Giardia lamblia* and/or staphlococci, 6 cases 2 of whom were gastrectomized; inflammatory duodenojejunitis, 4 cases without atrophy of the villi, 3 with *G.lamblia* and 1 probable infectious duodenojejunitis. Biopsies were obtained in multiple (5-12/subject) from the duodenum and upper loop of the jejunum; all were prepared for microscopy and stained; some semiquantitative determinations of staphylococci were made. Biopsies of bone and marrow were made in some instances of suspected osteomalacia. Levels of sideremia were measured; those with sideremia less than 60 μg were verified twice. The degree of steatorrhea was the av. amount of fat obtained in the 24-hr. stool collection on a minimum of 70 g of fat for 3 consecutive days. Among 10 subjects with steatorrhea 7 had a serum Fe level less than 60 μg. Among 12 subjects with hyposideremia 7 had steatorrhea. Among 10 hyposideremic patients who underwent a test for possible hyperglycemia (oral provocation), half showed a positive result. Among the 12 subjects with hyposideremia 6 had a hypoalbuminemia (less than 4 g%); 6 subjects with normal serum albumin had hyposideremia; 1 case with normal serum albumin and hyposideremia had exaggerated intestinal loss of protein. Among 14 cases of hypocalciuria 11 were hyposideremic. In general, hemoglobin conc. tended to be 75% or less among those with hyposideremia; the number of RBC was less than 4 million/mm^3; 6 had normal RBC count; 2 had a high count. Most cases of anemia were normochromic. In 1 case anemia was of 15-yr. duration, treated but with only incomplete and short-term results.

9144 ROLE OF VASCULAR INSUFFICIENCY IN DRUG-INDUCED SMALL BOWEL ULCERATION. (E.)

Mansfield, J. B. (Northwestern U. Med. Sch., Chicago, Ill.), F. B. Schoenfeld, M. Suwa, R. E. Geurkink and M. C. Anderson. Amer. J. Surg. 113(5):608-614, 1967.

In 24 dogs, two 0.5 g enteric-coated tablets were introduced into the distal ileum through a small opening made in the antimesenteric aspect of the intestine. Tablets (with a hole in the center) were tied to a fine silk ligature, anchored to intestinal wall near the ileostomy, and tablets were able to dissolve approx. 20 cm proximal to the ileocecal valve. In Group 1 (12) the tablets were NaCl; in Group 2, KCl. In 56, pressure in the splanchnic arterial circulation was reduced. Celiac and superior mesenteric arteries were exposed at their aortic origin, and pressures were obtained from the main trunk with a 25-gauge needle. Aortic pressure was monitored through a cannula in the right femoral artery. Pressure gradients were established between the aorta and the celiac and superior mesenteric arteries by constriction of the root of each vessel with a 1-0 silk ligature. Gradients of 25, 50 or 75% were produced between superior mesenteric artery and aorta; celiac pressure was reduced by 25% in all. Preliminary observations showed that a reduction in celiac artery aided in maintenance of an effective gradient in the ischemic superior mesenteric bed by a temporary reduction of collateral inflow. In 28 of those with reduced splanchnic artery pressure, NaCL tablets were introduced (Group 3); in 28, KCl (Group 4). Dogs that survived 48-72 hr. were sacrificed and the gastrointestinal tracts of all were carefully examined from the esophagus to the colon. Lesions were removed for histological study. Ten of 12 in Group 1 survived with no gross or microscopic abnormalities in any part of the gastrointestinal tract. Mortality in Group 2 was also 2 of 12, but gross and microscopic changes were observed: focal ulceration (1); diffuse inflammation in distal ileum (4). In Group 3 there was acute ileitis (4); ileal ulcer (1); hemorrhagic gastritis (4); superficial ulceration of duodenal lymphoid follicle (1). In Group 4 the number of lesions was increased compared with Group 3. Of 28, 15 had acute ileitis; 3, focal ulceration; 1, diffuse necrosis of mucos in the terminal ileum; 7, acute gastritis; 2, active ulcers; 1, focal gastric infarction. O 80, 54 had circumscribed areas of mucosal depression which were lymphoid follicles: duodenum (41); jejunum (12); ileum (1). The results are considered to support the theory t chronic vascular insufficiency predisposes the small intestine to injury by KCl.

9145 MALFORMATION OF THE SUPERIOR HORIZONT BRANCH OF THE DUODENUM. (Rus.)

Pyl'tsov, I. M. (Polyclin. No. 2, Moscow) and O. V. Turbina. Klin. Med. (Moskva) 45(4):99-1 1967.

Radiological examination revealed an anomaly i the development of the upper horizontal branch of the duodenum in 45 persons (15 males, 30 females; 38-56 yr. old). Changes included duodenal elongation slackening of various form loop formation, and lumen dilatation (1.5-2.0 fold) in 20 patients; this segment had significant motility. The position of the upper horizontal branch corresponded to variant I in 20 cases, to variant II in 7, to variant III i 18, to variant IV in 8 and to variant V in 2. No other anomalies were present. Advance of t contrast mass was delayed at the duodenum mobi partialis (the developmental anomaly, so-named duodenostasis of variable degree with retentio of Ba suspension from 1-3 hr. after initiation of the study was noted in all patients. Complaints were found in 40 of 45 cases; dull pai in the epigastric region occurred in 22, acute seizures of pain in 10, regurgitation or nause in 14, and jaundice in 3. Such symptoms were found for several yr., and were diagnosed as gastritis in 20, peptic ulcer in 15 and cholec titis in 5. Typical clinical symptoms in this form of anomaly of the duodenum were not obser Duodenum mobile partialis does not exclude the presence of accompanying diseases, such as gastritis, peptic ulcer and cholecystitis; in these cases, the intestinal anomaly contribute to more frequent recurrences of the accompanyi disease.

9146 INTESTINE VIABILITY OF MESENTERIC VESSELS. (Rus.)

Artemkina, N. I. ar V. V. Nekachalov. Eksp. Khir. Anest. 11(6): 19-21, 1966.

Both early (up to 7 hr. after initiation of th experiment) and late (at 10-12 hr.) changes i intestinal structure were found in rabbits (2 with experimentally-induced thrombosis. Early changes were manifested by vascular disorders (in the form of hemorrhagic infarction or mark anemia) and were reversible. Late changes developed at 10-12 hr. of the experiment, at which time the first symptoms of peritonitis and bacterial colonies in the intestinal wall were observed. Admin. of heparin (i.v.) duri a state of progressive intestinal gangrene whi

conditioned by obstruction of the mesenteric
sels, had no effect on the development of the
ease. Experimental results of treatment were
follows: 1) from 0-3 hr. after induction of
ombosis and admin. of heparin, 5 survivors and
ead; 2) from 3-6 hr. after the same procedure,
urvivors and 3 dead; and 3) from 6 hr. onward
er the same procedure there were 1 survivor
3 dead. Of those rabbits untreated, 1 sur-
ed and 8 died. Effective treatment of thrombo-
olic intestinal lesions is dependent upon
ly diagnosis and early operative intervention.

7 DUODENOPANCREATIC HOMOGRAFTS IN THE DOG.
(Fr.) Cuilleret, J. (Hotel Dieu, Lyon,
nce), C. Vieville, X. Delore, Y. Auffray,
Chavent, M. Barteille, J. Falconnet, J. Gilly,
Guillemin and J. Descotes. J. Chir. (Paris)
2):177-190, 1967.

lowing duodenopancreatic autotransplantation
th pancreaticoduodenal anastomosis of the
od vessels to the splenic vessels), the
tality rate in 10 dogs was 100%; 1 animal died
er 3 hr. of a reanimation failure, and the
er 9 dogs died after 12 hr.-3 days of venous
or peripheral arterial thrombosis (1),
orrhage (1), acute gastric dilatation (1),
denal necrosis (1) or Carré's disease (1).
od sugar levels rose during the intervention,
fell rapidly in the next 12 hr. to hypo-
cemic levels; amylase levels were not
nificantly increased, and external pancreatic
retion was always abundant several min. after
blood vessel clamps were released. None of
autografts developed acute pancreatitis.
lowing pancreatic homotransplantation, 14 of
dogs died within 48 hr.; 9 of these dogs had
ergone a 1-stage procedure and 5, a 2-stage
cedure. Causes of early postoperative death
e hemorrhage from the aortic stump (6), acute
rinolysis (1), peripheral arterial (2) or
ous thrombosis (2), intestinal volvulus (1),
itonitis (1) or intestinal invagination
ondary to pancreatectomy, reduced during the
fting procedure (1). In the other 10 dogs
survival time was 4-7 days in 7 and 12-16
s in 3; the cause of death was related only
graft rejection in 4 animals (sacrificed
er 7-16 days). The postoperative condition
good in animals surviving more than 48 hr.
erglycemia developed immediately after pan-
atectomy in all animals, but was rapidly
trolled by infusion of serum containing
tonic levels of glucose; in the animals sur-
ing more than 48 hr. the serum glucose levels
e normal, although an episode of secondary
erial thrombosis in 1 animal was accompanied
hyperglycemia, as were the terminal complica-
ns in all animals. A prolonged increase in
um amylase levels was also noted, but no
nges in SGOT or SGPT levels were noted in
eral dogs surviving 4 days or more. None of
se tests proved specific for graft rejection.
tological changes in the homografts of dogs
viving more than 4 days included interlobular edema with lymphoplasmacytic infiltration, followed (in 2 dogs) by arterial lesions; the terminal stage of rejection was accompanied by edema and necrosis of the exocrine tissue, sparing the islets of Langerhans for a prolonged period. Only 1 animal showed signs of acute pancreatitis.

9148 A SIMPLE DEVICE FOR TIMED SAMPLING IN PHYSIOLOGICAL STUDIES OF THE HUMAN SMALL BOWEL IN VIVO. (E.) Barreiro, M. A. (McGill U. Med. Clin., Montreal, Canada), R. D. McKenna and I. T. Beck. Gastroint. Endosc. 13(4):28-30, 1967.

Normal humans (41) underwent a total of 45 intubations of the small intestine. In 19 the proximal 50 cm of jejunum was studied through a multiple-lumen polyvinyl tube; internal diameter of catheter was 1.12 mm. A "basket" of polyvinyl tubing surrounded the main collecting catheter. Several 4-cm segments of 00 surgical wire were threaded through the polyvinyl tubing. The ends of the tubing were flame-sealed, flattened by gentle pressure with surgical forceps, and glued on to the main tube with tetrahydrofurane. The wire was completely enveloped in polyvinyl tubing and could not damage the intestinal wall. Of 45 intubations, 23 were unsuccessful (51.1%). Of these, 12 (52.1%) were due to sampling difficulties, but after introduction of the basket, there was only 1 failure in 26 attempts (3.8%). The proximal segment of jejunum was studied by 22 intubations in 19 patients. In 64 different experiments, there were 845 intraluminal samplings in 1644 min. of sampling time. The av. time between samples was less than 2 min. and sample vol. were 3-5 ml.

9149 INTESTINAL ANGINA SECONDARY TO COMPRESSION OF THE COELIAC AXIS. (E.) Terpstra, J. L. (Leiden U. Hosp., Netherlands). Arch. Chir. Neerl. 18(4):245-253, 1966.

Surgical treatment of hiatus aorticus involves midline incision in the upper abdomen; opening of the lesser omental bursa with stomach and pancreas being kept in a caudal position; the celiac artery is approached ventrocranially and dissected free; whenever possible the celiac nerve plexus is left intact; a curved clamp is pushed below the middle part of the rim of the hiatus anterior to the aorta and, with this as a guide, the hiatus is divided and cut to a depth of 3-4 cm; small arterial branches to the diaphragm from the main stem of the celiac artery are ligated to prevent problem bleeding, while bleeding from small arterial branches in the hiatus can be stopped by coagulation. The lateral and caudal sides of the celiac artery are not touched, overlying structures are not ligated, and the abdominal wall is sutured in layers. Seven patients were operated on: 4 became asymptomatic, in 1 symptoms were alleviated, but wasting continued, and 2 received no benefit. In the latter 3 there was a distinct compression of the celiac artery with a pressure of more than 25 cm Hg between aorta and celiac artery. The lack of improvement was not surprising since the indication for operation was nonspecific abdominal pain present for several yr. with no pathological finding other than narrowing of the celiac artery on X-ray examination. On the basis of symptoms, anatomical and embryological aspects, it is suggested that the syndrome of intestinal angina is a new clinical entity. A longer follow-up is suggested (max. to date, 18 mo.) before definite conclusions can be reached.

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See also abstract nos.: 8902,8954,9084,9407,9667

97 STUDIES ON OLIGOSACCHARIDE SULFATES AND MONOSACCHARIDE SULFATES FOR MEDICAL
RPOSES. I. ANTIPEPTIC AND ANTIULCEROGENIC
OPERTIES OF THE DISACCHARIDE SULFATES. (Jap.)
mekata, M. (Chugai Pharm. Co., Ltd., Tokyo),
Matsuo, A. Momose and M. Takagi. Yakugaku
sshi (J. Pharm. Soc. Jap.) 87(4):376-380, 1967.

e relatively low molecular wt. compounds, salts of sucrose, lactose and maltose lfates, showed strong antipepsin (in vitro) d antiulcer (pylorus-ligated rats) activities mparable to the sulfate esters of polysaccharides en highly sulfated. These effects were ineased with increasing number of sulfate dicals. The nonreducing sucrose salts having primary hydroxyls in its molecule had the rongest activity, although the comparable mpounds of lactose and maltose were not much ss active. Thus when sucrose sulfate (21.2% lfur) was added to standardized pepsin soln. in ounts of 1, 3, 5 and 7 mg/ml, the pepsin tivities remaining were 80.3, 54.0 36.7 and .2%, resp., of the activity of preparations thout sucrose sulfate. Comparing the enzyme tivity remaining after the addition of 5 mg of number of different substances to separate ml vol. of pepsin soln., the following perntages were obtained: heparin (58.4), ondroitin sulfate (75.2), dextran sulfate 7.6), oxidized starch sulfate (32.9). Doses 25, 50, and 75 mg sucrose sulfate (21.2% lfur) inj. i.v. into groups of 5 Shay rats each ve complete protection against ulcer formation, did 30 mg of oxidized starch sulfate (14.6% lfur); all control animals developed multiple cers. Gastric juice vol. was normal, but free d total acid were depressed to a greater tent by the sucrose compound (as much as 33%) an by oxidized starch sulfate (11%); pepsin nc. was reduced to 40% by the sucrose compound compared to a reduction to 29% by the idized starch sulfate. The same experiment peated with the sucrose sulfate (21.2% sulfur) j. s.c. showed no effect whatever upon the cidence of peptic ulcer or upon the composition gastric juice. These experimental results ggest that the sulfate radical bonded to the imary hydroxyl is the active group.

198 CONSTITUTIONAL FACTORS AND THE FREQUENCY OF IMMOBILIZATION ULCER IN THE RAT.
Fr.) Lambert, R. (Fac. Med., Lyon, France),
. S. Martin, G. Vouillon and F. Martin. C.R.
oc. Biol. (Paris) 160(11):2127-2131, 1966.

total of 690 Wistar rats, 314 males and 376 emales (100-400 g), from 7 different regions of rance were immobilized in a metal grill corset or 24 hr.; they were not fasted and received 10 l of physiological saline i.p. The control nimals, in like number, were untreated. Ulcers eveloped in 429 (62%) of the restrained rats, a omewhat lower percentage than reported by others. he number of ulcerated male rats was 117 (56%), the number of ulcerated females, 252 (67%). Of the 195 rats weighing 100-150 g, 168 (86%) developed ulcers, as did 190 of 323 (59%) weighing 150-200 g, and 71 of 172 (41%) weighing more than 200 g. Thus the young were the most susceptible. The geographic origin exerted an effect upon the frequency of ulceration, varying from 43-81%, but independent of the distance transported. The effect of stress due to transportation was ruled out by testing animals 1-22 days after their delivery to the laboratory. The differences seem to result from their previous environment. The influence of the time of yr. with respect to temperature and duration of daylight was tested: 94 of 158 rats tested (59%) formed ulcers during February and March; 209 of 266 (78%) tested during April and May and 114 of 244 rats (46%) tested in June and July developed ulcers. Grouped according to geographic origin with respect to high and low susceptibility to restraint ulceration and also in terms of time of yr. (three 2-mo. periods as above) the percentages were for the high-incidence group 72, 86 and 62, resp., and for the low-incidence group 48, 64, and 39, resp., indicating the operation of independently variable factors.

9199 THE EFFECT OF 1,3-DIHYDRO-7-NITRO-5-PHENYL-2H-1,4 BENZODIAZEPINE (MOGADON) ON GASTRIC ULCERS PRODUCED BY RESTRAINING RATS AND ALBINO MICE. (Fr.) Mercier, J. (Lab. Human Biol., Marseille, France) and S. Lumbroso. Arch. Int. Pharmacodyn. 167(1):35-38, 1967.

Admin. s.c. of 10-20 mg/kg of the title benzodiazepine derivative to rats which were to be restrained for 7 hr. reduced the production of gastric ulcers in 20, 40 and 40% of the cases, resp. Max. protection was obtained at 15 mg/kg. A more significant protection was obtained when admin. to albino mice: 5, 15 and 20 mg/kg s.c. provided protection in 20, 40 and 70% of the cases, resp. In part, this increased sensitivity found in mice resulted from their having been fasted for 24 hr. prior to confinement. Restraining alone produced at least 1 gastric ulcer in 60% of the rats and 70% of the mice. The data indicate that the agent is 3 times as active as a comparable dose of Librium in protecting these animals from developing restraint gastric ulcers, despite the fact that it is approx. 10 times more active than chlordiazepoxide as a tranquilizing agent.

9200 EXPERIMENTAL GASTRIC ULCER BY SEROTONIN IN THE RAT AND ITS PREVENTION. (Fr.) Bel, A. (Red Cross Hosp., Lyon, France), R. Levrat, J. Nesmoz and M. Girard. Rev. Int. Hepat. 17(2):65-78, 1967.

In 35 rats inj. s.c. with 15 mg/kg serotonin 20 and 6 hr. before sacrifice, no deaths occurred; vasomotor reactions in spots and bands, sometimes diffuse or deep red or purple, on which ulcerations erupted, appeared in 54%; ulcers occurred in different numbers up to 20/rat usually located near the greater curvature, irregular in shape, covered with a dark crust, surrounded by a halo of vasodilatation when not situated in a spot or band of vasodilatation. These ulcers of hemorrhagic origin occurred in 88.5% of the animals; the ulcer index (number of ulcers/rat) was 9. Normal and vagotomized animals showed no difference upon inj. of serotonin. Nephrectomy had no decided effect upon the action of serotonin whereas adrenalectomy strongly potentiated the effect of serotonin; after adrenalectomy, the standard doses of serotonin produced ulcers in 92.3% with an ulcer index of 22.1. Normal rats were inj. (route not given) with a number of protective compounds 0.5 hr. before inj. of serotonin. These compounds, the dosages, and the resulting ulcer indices were: (1) methysergide, 2 mg/kg, index 1.7; 4 mg/kg, index 6; 8 mg/kg, index 4.5; (2) cyproheptadine, 1 mg/kg, index 1.3; 2 mg/kg, index 2.0; (3) dimethothiazine, 10 mg/kg, index 12; 15 ml/kg, index 7.5; 40 mg/kg, index 7; 100 mg/kg, index 4; (4) chlorphenoxamine, 20 mg/kg, index 9; 30 mg/kg, index 2; 40 mg/kg, index 4; (5) trioxypropiophenone, 30 mg/kg, index 9; (6) L.D 3055, 2 mg/kg, index 11.6; 4 mg/kg, index 9. Urogastrone (3-12 U) was ineffective.

9201 PROTECTION EFFECT OF α,α-DIPHENYL-α-PROPARGOXYACETIC ACID β-DIMETHYLAMINOETHYL ESTER HYDROCHLORIDE ON SHAY ULCER. (It.) Torrielli, M. V. (U. Perugia, Italy) and P. Capitanucci. Boll. Soc. Ital. Biol. Sper. 42(24):1996-2001, 1966.

Several groups of male Wistar rats, weighing approx. 180 g at the start of the experiment, were subjected to Shay ligature of the pylorus 17 hr. before sacrifice. The experimental drug was admin. 0.5 hr. prior to surgery, in single, s.c. doses which progressed geometrically by a factor of 2 from 1.875-30.0 mg/kg. The degree of ulceration induced and the amount of gastric damage involved were tabulated in terms of Placer's Index for control animals and for animals receiving 3.75, 7.5, 15.0 and 30.0 mg/kg, as follows: 94.7, 56.3, 47.9, 57.8 and 63.8, resp.; indicating a max. protective effect at a dose level of 7.5 mg/kg, with progressive diminution of protective activity thereafter. Mean measurements of the total vol. of gastric secretion, pH and both total and free acid at dose levels 1.875-15.0 mg/kg were essentially consonant with the indicated reversal of the drug effect.

9202 PREVENTIVE ACTION OF ISOPROPAMIDE ON EXPERIMENTAL STRESS ULCER OF WHITE RATS. (Fr.) Liefooghe, J. (Fac. Med., Lille, France) and Y. Vantorre. J. Sci. Med. Lille 85(3): 169-174, 1967.

Three groups of rats were maintained under stress conditions, the animals being placed in a wire-latticed corset, with 4 holes for the paws, so that they do not touch the ground. Al rats in the first group were raised in the laboratory; the control group showed 31% gastri ulcers, while those inj. twice prior to the tes with Isopropamide showed a 12% incidence. In the second group the rats were brought in from outside, and the corresponding incidence of ulcers was 60% and 53%. In the third group the rats were also brought in from outside, but the Isopropamide was perfused s.c. continuously for the entire period of stress, which was also preceded by an inj. of Isopropamide (4 mg/kg/da In the control group, 80% had ulcers, while 14.3% of the treated animals had ulcers. The difference is highly significant and it is concluded that isopropamide in certain experimenta conditions efficiently prevents gastric lesions (gastric congestion, ulcerations) due to stress principally by acting as an anticholinergic.

9203 EXPERIMENTAL PRODUCTION OF CHRONIC PEPTIC ULCER. (Sp.) Gutiérrez Rivas, V. E., G. Guardia Salas, G. López De Aguilar an A. Olivera N. Acad. Peru. Cirug. 19(1):33-39, 1966.

Peptic ulcers were induced experimentally in 15 dogs (9-15 kg body wt.) according to the Mann-Williamson Type 1 method in which end-to-end anastomosis was performed between the stomach and distal end of the jejunum and end-to-side anastomosis between the proximal end of the jejunum and terminal portion of the ileum. Dextrose soln. and tetracycline were admin. during surgery to all but 5 dogs. These animals died several days later from rupture at the sit of anastomosis and peritonitis (4 dogs) or obstruction at the level of the gastrojejunal anastomosis (1). By day 15, the surviving animals had lost 40% of their body wt.; by day 21, animals had lost 70% of their body wt. and the cachexia had become worse. The Thévenon feces test was positive in all animals; all had hypochromic anemia and hypoproteinemia; none showed signs of hepatic insufficiency. By days 21 and 27, radiologic signs of peptic ulcer were observed. The presence of peptic ulcer wa confirmed at autopsy. Death occurred between days 26 and 38; causes of death were perforatio of peptic ulcer (2), bleeding at the site of gastrojejunal anastomosis (2), marked malnutrit (3), or bronchopneumonia (3). The etiological cause of peptic ulcer in each case is not entirely clear: a principal factor seems to be the constant trauma caused by jets of hydrochloric acid and pepsin against a mucous membrane not protected by alkaline secretions as i the case normally in the upper portions of the intestine, although marked hypoproteinemia may also be an important factor in ulcer production

9204 RESULTS OF SURGERY FOR PEPTIC ULCER OF THE STOMACH AND DUODENUM. EXPERIENCE WITH THREE THOUSAND, THREE HUNDRED GASTRIC OPERATIONS. (E.) Chrysospathis, P. (U. Athens

ece) and B. Golematis. Pacif. Med. Surg.
2):96-104, 1967.

ee diagnostic tools were used: X-ray, measure-
t of gastric acidity, Gastrocamera. Operative
cedures in authors' clinic were gastroenteros-
y (3.21%), vagotomy and drainage (4.7%),
tial gastrectomy (92%), total gastrectomy
1%). Patients were 82% men, 18% women. The
distribution was: up to 30 yr., 19%; 30-60,
; above 60, 10%. Ulcer locations were: stomach
.3%), duodenum (75.1%), both (0.9%), pyloric
nosis (9.8%), stomal ulcer (1.9%). Gastro-
erostomy was done in the aged with pyloric
nosis, poor physical condition and severe
er symptoms, or perforation of duodenal ulcer.
106, cases, satisfactory results were obtained
100, recurrent ulcer in 1, mortality of 5.
otomy was performed in hyposecretors under 30
, active pulmonary tuberculosis, pyscho-
rosis with intractable ulcer symptoms, poor
ks, those with technical problems of duodenal
mp closure aged persons with active ulcer and
plications. Of 155 cases, favorable results
e obtained in 136. Both types of gastrectomy
e used. Billroth-I was done in those with
tric and duodenal ulcers, with 50% and 67%
mach resection, resp., and was preferred
ause of its more physiological nature. Of
of these procedures, 246 showed the following
plications over 4-6 yr.: recurrent ulcer,
mia, stomal dysfunction, dumping syndrome,
tprandial epigastric discomfort. Billroth-II
done in 2618 cases in 3 variations: Reichel-
ya (1231), since discarded because of high
quency of complications and mortality (1.6%);
fmeister-Finsterer (948) with 0.42% mortality;
ificial pyloric canal type, with few complica-
ns and zero mortality. The latter is favored,
purpose to delay gastric emptying and to
ulate passing of stomach contents by a valvular
hanism added in the upper end of canal with
errupted fine silk sutures. Its advantage is
gain (in 60%), ability to enjoy a free diet,
a low incidence of stomach intolerance to
k. In a 6-yr. follow-up of 120 cases, com-
ints were anemia (1), superficial gastritis
, diarrhea (1) (total 2.5%). In the first 2
lroth-II technics, there were 9% and 7.3%
plaints, resp.

5 GASTRIC SECRETORY TESTS. PRO AND CON.
(E.) Passaro, E., Jr. (Wadsworth Hosp.,
Angeles, Calif.) and H. E. Gordon. Amer. J.
g. 114(2):333-339, 1967.

otal of 1134 gastric secretory tests were
ducted over a 4-yr. period on a variety of
ients. A betazole secretory test was per-
med on 665 patients as follows: in 285 before
ration and 105 after operation for peptic
er, in 170 patients with miscellaneous
gnoses and in 105 normal subjects (patients
iting herniorrhaphy who gave no indication of
tic ulcers or other serious illness), who
ved as controls. A Hollander (insulin) test
was done on 359 patients as follows: in 144 before operation and 198 after operation for peptic ulcer and in 47 patients with miscellaneous diagnoses. In addition, gastric secretory tests (unspecified) were performed on 22 patients with chronic pancreatitis and 4 patients with parathyroid adenomas. Only 20% of the patients with duodenal ulcer had a peak rate of secretion beyond the range of controls, with the betazole test. When comparison was made between these patients and controls in each decade of life; however, a statistically significant difference emerged; older patients with duodenal ulcer had a level of gastric secretion which was significantly higher than their peers in the control group. In patients with gastric ulcer, results were more variable; although the av. level of secretion in this group was lower than that in the control group or the group of patients with duodenal ulcer, the difference was not statistically significant. A postoperative Hollander test, used to determine vagal integrity after operation, delineated 3 groups of patients: 1) those in whom no increase in gastrin secretion occurred after insulin hypoglycemia; these were judged to have a complete vagotomy; 2) those in whom an increase over basal levels occurred in the first hr., which indicated an incomplete vagotomy; and 3) those in whom a modest increase in acid secretion over basal levels occurred during the second or third hr. after stimulation; the significance of this latter response was not clear, but it was considered to be indicative of incomplete vagotomy. In spite of histologic evidence of both vagal trunks having been excised in 22 patients, 32 (16%) of 198 patients had an incomplete vagotomy by these Hollander criteria; in the remaining 10 the left nerve was missed twice and neither nerve was excised in 8. The secretory response in 22 patients with histologic evidence of chronic pancreatitis was not significantly different from that of the control group; no patient had hypersecretion. The level of gastric secretion in 4 patients with parathyroid adenomas was well within the normal range; however, there was a decrease in gastric secretion after removal of a parathyroid adenoma in a patient with multiple endocrine adenopathies. While the standard betazole test is safe, practical, gives highly reproducible results and is easy to perform, the results of this study (and others) show that the test has only limited application to the diagnosis of peptic ulcer. Achlorhydria is best determined by a standard betazole test. The Hollander test is not recommended for patients with a history of severe heart disease, strokes, seizures or general debilitation.

9206 MAXIMAL HISTAMINE RESPONSE IN DUODENAL ULCER PATIENTS. (E.) Patel, J. M. (Med. Coll., Baroda, India), B. K. Vyas, W. P. Small and P. M. Trivedi. Indian J. Surg. 29(2): 57-65, 1967.

Of 94 duodenal ulcer patients, 91 were vegetarians.

There were 40 normal controls, (half each sex) from the hospital's surgical wards. The method of Kay was used; 50-100 mg promethazine was used as an antihistamine. On monitoring, the Levin tube had to be readjusted in 56% of the cases. Eight women were dropped because of tube discomfort. Histamine was well tolerated by all; 11% showed a mild histamine reaction. The test was repeated after 1-4 days in 6 cases of duodenal ulcer; basal secretion in the 2 tests varied widely (6-18%); max. acid output was fairly comparable (3.1-8.2%); the av. difference between the 2 tests was 5.7%. Av. basal secretion and normal max. acid output in men and women, resp., were: 2.5 and 2.0 mEq; 12.02 and 7.19 mEq. There was no significant difference in acid secretion between uncomplicated male cases (48) and controls; acid secretion was significantly lower in uncomplicated women cases than in uncomplicated men. Basal output increased with age to 40 yr. and then decreased. Max. acid output in both sexes was linear with age, with a peak at 31-40 yr. The parabolic curve of wt. in both sexes correlated well with the parabolic curve of max. output up to 50 yr. There were significant differences in max. acid output between men and women; in each age group, females secreted a lesser amount of basal and max. acid than corresponding males; at all age groups, the av. hemoglobin levels for females were lower than males. Both acid outputs in both sexes increased with wt.; women secreted less acid than men, except in the wt. group of 31-40 kg at 31-40 yr. and 41-50 kg at 41-50 yr. Acid output in smokers was higher than in nonsmokers. With increase in duration of symptoms up to 13 yr., there was a gradual rise in max. acid output, which later declined. There was no significant difference between uncomplicated cases and those with hemorrhage (10) or perforation (13); there was a significant difference in those with stenosis (20).

9207 POSTMORTEM STUDIES ON THE RELATIONSHIP BETWEEN SEVERE ARTERIOSCLEROSIS AND GASTRODUODENAL DISORDERS. (Ger.) Lange, H.-J. (Johannes-Gutenberg U., Mainz, Germany) and K.-J. Hempel. Bruns Beitr. Klin. Chir. 214(2):202-212, 1967.

In 2774 autopsy reports on 1646 male and 1128 female cadavers of persons more than 40 yr. old, the degree of arteriosclerosis was noted as was the extent and severity of gastric and duodenal ulcer; correlations were made not only with respect to these diseases (arteriosclerosis and ulcer) but these were correlated with cancer and also with accidental death. Every possible comparison was made. The data were treated statistically. It was concluded that, avoiding heterogeneity and errors by unequal selection in the comparative groups, in males severe general arteriosclerosis was found considerably more frequently in cases with ulcers (without accident) when compared to a group of males who were killed in an accident (with and without ulcer). The difference is statistically significant.

9208 ISOENZYMES OF ALKALINE PHOSPHATASE IN PATIENTS OPERATED UPON FOR PEPTIC ULC (E.) Pulvertaft, C. N. (York City Gen. Hosp., York, England), J. E. Luffman, E. B. Robson, H Harris and M. J. S. Langman. Lancet 1(7484): 237-239, 1967.

Studies were made on 5 55 men who had undergon Polya gastrectomy to determine if increased levels of total serum alkaline phosphatase resulted from an increase in the intestinal component. The mean serum alkaline phosphatas was greater in individuals with Blood-Groups 0 and B (8.2 King-Armstrong U) than in Group-A individuals (7.2 U) but the difference was not statistically significant. The intestinal alkaline phosphatase component was studied by electrophoresis in 134 men treated by Polya partial gastrectomy and in 69 controls treated by vagotomy or drainage. As in normal persons the intestinal fraction was seldom found in nc secretors or in Group-A secretors, whatever th gastric operation done. It was found, as expected, in the serum of 0 and B secretors, but no significant differences were detected between the frequencies of incidence in Polya gastrectomy patients and in those who underwen vagotomy and drainage. No suggestion was foun that the intestinal isoenzyme appeared especia often after surgery in those patients with preoperative total phosphatase levels of 12 or more King-Armstrong U. The increased total serum alkaline phosphatase levels seen in partially gastrectomized patients is probably not due to increased amounts of the intestinal component.

9209 THE CONTENT OF CERTAIN PROTEIN-BOUND SUGARS IN GASTRIC JUICE OF PATIENTS GASTRODUODENAL ULCER. (Rus.) Rabinovich, P. (Chita Med. Inst., USSR). Ter. Arkh. 39(1): 43-49, 1967.

A study was performed on 144 patients (103 men 41 women) with peptic ulcer (pyloro-duodenal 96, and on the lesser curvature in the subcardiac region in 48) of 1-30 yr. duration, 2 patients (14 men, 15 women) with chronic cholecystitis or gastritis, gastric carcinoma and dysentery, and in 29 healthy normals (18 men, 11 women) who were 17-65 yr. old. Durin exacerbation of duodenal peptic ulcer, the co of all protein-bound carbohydrates in the gastric juice, especially after fasting, was decreased. During exacerbation of gastric peptic ulcer the conc. of fucose and sialic a in the gastric juice (fasting) was decreased, and the conc. of hexoses was decreased only insignificantly. After stimulation of secret the differences in conc. of protein-bound carbohydrates in the various groups were insignificant. During the active period of tic ulcer the content of fucose bound to oluble mucin proteins in the gastric juice decreased. The conc. of fucose in gastric ce was markedly increased during the initial iod of recovery. The conc. of sialic acids protein-bound hexoses and hexosamines in- ased only at the pyloroduodenal localization the ulcers. Decrease in the amount of fucose the gastric juice glycoproteins, especially in oluble mucin, may play a decisive role in kening of the mucous membrane of the gastro- denal portion of the peptic ulcer and in the hanism of pain production.

0 PHARMACODYNAMIC STUDY OF THE ASSOCIATION OF AN ANTISPASMODIC AGENT AND TRAN- LLIZER RECOMMENDED IN THE TREATMENT OF DIGES- E TRACT ULCERS. (Fr.) Mercier, J. (Fac. Med. rm., Marseille, France), S. Dessaigne, M. R. end, P. Etzensperger and J. Veran. *Path. Biol.* *ris)* 15(7-8):441-446, 1967.

various pharmacodynamic properties of 170-JD iglium"), composed of a tranquillizer (mephen- lone; OM-518) and an antispasmodic agent octylatropine bromide; AD-122), were deter- ed experimentally. The acute toxicity of the ociation (LD_{50} = 2.25 g/kg) was determined in ss albino mice according to the Karber-Behrens hod; the compound was classified as "slightly ic" according to the Hodge-Sterner classifica- n. In small doses (5.1 and 10.2 mg/kg i.v.), -JD exerted an inhibitory effect upon gastric d secretion (determined by the Noordwijk- sen method) in Wistar albino rats. The speed intestinal transit was clearly diminished by -JD; the intestinal depressant effect of 122 was 2.4-4 times greater than equivalent es (10 and 20 mg/kg p.o.) of atropine. The ative and preventive *in vitro* effects of -JD on acetylcholine-induced duodenal spasm rats was 4 and 10 times, resp., less than t of atropine and 100 times (in both cases) ater than that of papaverine; AD-122 was ally effective as atropine, but 15 times less ective than papaverine in relieving $BaCl_2$- uced duodenal spasm. Spontaneous gastro- estinal contractions in chloralosed dogs were ested for 20 min. following i.v. inj. of 50 kg of 170-JD. Pilocarpine (1 mg/kg) and stigmine (30-50 μg/kg)-induced gastrointestinal tractions were inhibited by doses of 50 and μg/kg of 170-JD. The stimulating effect of phine hydrochloride (1 mg/kg) on the digestive ct was inhibited by 100 μg/kg of 170-JD, ereas 250 μg/kg of 170-JD failed to inhibit stimulating effect of $BaCl_2$ (1 mg/kg). -JD inhibited sphincter of Oddi contraction luced by morphine in chloralosed dogs, but en inj. before morphine caused only a reduction the degree of contraction. Like atropine, 122 decreased or temporarily suppressed pilo- rpine-induced salivation at doses of 20, 30, 50 μ g/kg, and caused prolonged inhibition doses of 100 μg/kg. 170-JD showed no chronic icity (except for decreased wt.) in albino rats and rabbits (Bourgogne "Fauve" strain) treated with human therapeutic doses (34 mg/kg/60-kg adult) and 5 and 10 times that amount for 78 (rats) or 101 days (rabbits). The sedative, mydriatic, respiratory, and cardiovascular effects of 170-JD were also tested.

9211 EVACUATORY GASTRIC FUNCTION IN DUODENAL ULCER PATIENTS EVALUATED BY MEANS OF RADIOCAPSULE WITH pH RECORDER. (Rus.) Votchal, B. E. (Cent. Inst. Advanced Train, Phys., Moscow), A. S. Belousov and G. L. Levin. *Klin. Med.* *(Moskva)* 45(3):20-26, 1967.

This study was made on 33 patients (25 men, 8 women; 18-45 yr. old) with duodenal ulcer of less than 1 to more than 5 yr. duration. In 18 persons the type of acid secretion was excitable; in 5 it was inhibitory, in 7, asthenic, and in 3 it was inert. In healthy persons with an excitable type of acid secretion, evacuatory function (in a fasting state) displayed a period of pH fluctuation which lasted 5-10 min. and alternated with periods of rest; there were stable pH values of 7.0-8.0 for up to 40 min. after feeding a bread breakfast, i.e., gastric evacuation was absent. Approx. 20-40 min. after a bread breakfast, there were rhythmical, undulatory fluctuations of pH lasting 1-2 min., with a sharp decrease of pH to 3.0-4.0 and a rapid return to initial values. The evacuatory function in patients with duodenal ulcer who had an excitable type of acid secretion showed a period of pH fluctuation lasting 30 min. or more; there was no period in which evacuation did not occur; i.e., after a bread breakfast, significant and irregular discharges of gastric content into the duodenum occurred; after a bread breakfast there were marked pH fluctuations, with duration of individual waves of up to 20 min. or more. In patients with duodenal ulcer, during the period of exacerbation (markedly pronounced pain syndrome, vomiting) there were periods of especially pronounced gastric evacuation. An analogous picture of gastric evacuation, studied by means of radiotelemetry, was found in patients with an asthenic and inert type of acid secretion; however, in a number of patients with an asthenic type of acid secretion, immediately after a bread breakfast there was a period of no gastric evacuation lasting 20-30 min., and at the same time duodenal pH was 7.0-8.0; this was followed by vigorous gastric evacuation and alteration of pH fluctuations, with individual large fluctuations lasting up to 30 min. In patients with duodenal ulcer and an inhibitory type of acid secretion, during a period of exacerbation feeding of a bread breakfast was followed by continuous discharge of gastric contents, with a gradual decrease in duodenal pH (to 1.0-2.0); this continuous discharge of gastric contents lasted for 1 or more hr. in several patients. This was followed by a period of undulating pH fluctuations. Thus, the radiocapsule with a pH recorder may be used for study of gastric evacuation in both healthy individuals and in those with duodenal ulcers. Three case histories are presented in some detail.

9212 MORPHOLOGICAL CHANGES OF THE DUODENAL MUCOUS MEMBRANE IN PEPTIC ULCER (ASPIRATION BIOPSY DATA). (Rus.) Sadkova, T. N. (Lab. Gastroent., Acad. Med. Sci., Leningrad, USSR) and V. M. Zolotova. *Klin. Med. (Moskva)* 45(2):35-40, 1967.

A study of aspiration biopsy data from 63 patients with peptic ulcers of gastric (15) and duodenal (48) location revealed 4 types of morphological changes of the duodenal mucous membrane. A normal mucous membrane was found in 10 of 15 with gastric ulcers and 12 of 48 with duodenal ulcers. A superficial duodenitis (characterized by a variable cellular height, subepithelial edema, frequent epithelial desquamation and removal of borders between the cells) was present in 1 of 15 with gastric ulcers and 2 of 48 with duodenal ulcers. A diffuse duodenitis (marked lymphocytic-plasmacytic infiltration often in combination with moderate eosinophilia, and infiltration of Brünner's glands from the submucous into the mucous layer) was observed in 2 of 15 and 6 of 48, resp. Atrophic duodenitis (characterized by villous atrophy, reduced thickness of the mucous membrane, crypts, and a larger amount of connective tissue) was moderately pronounced in 2 of 15 and 23 of 48, resp., and markedly pronounced in 5 of 48. Qualitative and quantitative alterations of the glandular epithelium were directly dependent upon the extent of the pathologic process in the mucous membrane. Three phases of the morphologic process were found in duodenitis, i.e., exacerbation, regression and remission. In peptic ulcer uncomplicated by duodenitis, pain was periodic (depending on the time of feeding, and quality and quantity of food), and disappeared after eating; exacerbation of pain was seasonal in character. Such variation(s) were present in 25 of 63 patients. Peptic ulcer complicated by chronic duodenitis and with a morphologic picture of a diffuse and atrophic process was diagnosed in 38 of 63. These patients had a persistent pain syndrome. Antiulcer therapy was effective in the former group, and only slightly effective in the latter group. The dumping syndrome was found in 5 of 38 patients. It is concluded that aspiration biopsy facilitates the determination of different forms of duodenitis in patients with peptic ulcer. One case history is given in detail.

9213 PHARMACOLOGIC AND CLINICO-PHARMACOLOGIC STUDIES ON NEW ULCER-INHIBITING DRUGS (BIOSPAN, TRIOSPAN). (Ger.) Vizi, E. S. (Med. U., Budapest) and P. Szentmiklósi. *Z. Aerztl. Fortbild. (Jena)* 61(7):353-358, 1967.

A combination of the properties of the ulcer-inhibiting compounds isopropamide and No-Spa, (6,7,3',4',-tetraethoxy-1-benzyl-1,2,3,4-tetrahydroisoquinoline), a compound less toxic than papaverine and more rapidly absorbed, was studied. The p.o./i.v. index for No-Spa is 14.0 and for papaverine, 33.9. Combining isopropamide and No-Spa did not increase the toxicity over that of the separate compounds and they retained the useful activities. When tested on Shay ulcer preparations the combination was superior to th single compounds. The effectiveness of a combination of 3 compounds was next tested: Isopropamide-No-Spa and Quietidin (not identifi Quietidin has anti-histamine, parasympatholytic spasmolytic, and tranquilizing actions. The properties of the combination of the 3 compounds, in terms of absorption, toxicity, etc., were not different from those of the single compounds when tested on animals. These combinations, Biospan (5 mg isopropamide plus 6 mg No-Spa) and Triospan (5 mg isopropamide plus 6 mg No-Spa and 60 mg Quietidin in tablet form were then tried clinically. After tests on a patient population which also contained cases o digestive tract disorders other than ulcers, i was concluded that Biopsan had the greatest therapeutic index, 26 times greater than atropi followed by Triospan when tested clinically fo over 6 mo. Biopsan had the least side reactio and also the best record for recovery or cure. In general, recovery was indicated by (1) fewe subjective complaints, (2) reduction or disappe ance of X-ray pathology, (3) gastric acidity normalized or significantly decreased, (4) increased body wt. of the patients.

9214 VITAMIN THERAPY OF PEPTIC ULCER. (Rus Shilov, P. I. (Milit. Med. Acad., Leningrad, USSR) and T. N. Iakovlev. *Klin. Med (Moskva)* 45(2):40-45, 1967.

Of 323 patients (274 men, 49 women; 127 of whom were under 30 yr. of age, and 196 of whom were over 30) with peptic ulcers (duodenal in 300, gastric in 23) of less than 1 yr. to more than 5 yr. duration, 237 received hormone therapy an 86 served as the controls. The av. duration of treatment for the hormone group was 37.1 days, and that of the controls was 43.1 days. Pain had disappeared after 1-2 wk. of treatment in 40% of the hormone group and 22.1% of the controls; a marked clinical improvement was obtained in 50.6% of those treated with hormone and in 43% of the controls, while partial improvement was observed in 48.1% treated with hormones and 53.5% of the controls. There was no effect observed in 1.3% of the hormone group and in 3.5% of the controls. Pain disappeared in 59 of 63 treated with ascorbic acid plus bioflavonoids (Group 1), in 66 of 75 treated with ascorbic acid and the vitamin B complex (Group 2), in 38 of 40 treated parenterally with thiamine (Group 3) and in 56 of 59 treated with thiamine and other vitamins (Group 4); in the remaining patients (18), pain was only reduced. The ulcer niche was closed in 26 of 63 patients of Group 1, in 27 of 75 in Group 2, in 12 of 40 in Group 3 and in 23 of 59 in Group 4; of the remaining 149 patients, the ulcer niche was decreased in 45, indirect signs were found in 75 and no data were available on 29 patients. A marked clinical improvement was found in 27 of 63 patients in Group 1, in 41 of

Group 2, in 21 of 40 in Group 3 and in 31
in Group 4. Partial clinical improvement
red in 36 of 63 in Group 1, 33 of 75 in
2, 19 of 40 in Group 3 and 26 of 59 in
4. No change was found in 1 of 75 in Group
59 in Group 4. The duration of treatment
oup 1 lasted 39.9 days; that in Group 2 was
days, Group 3, 35.3 days and Group 4, 35.2
It is concluded that vitamins have a
ive effect on the clinical course of
nts with peptic ulcers.

EARLY SYMPTOMS OF NEUROGENIC GASTRIC
WALL DYSTROPHY AND THE EFFECT OF NEURO-
C AGENTS. (Rus.) Zavodskaia, I. S. (Inst.
Med., Leningrad, USSR) and A. A. Manina.
. Eksp. Biol. Med. 63(3):75-78, 1967.

imental dystrophy of the gastric mucous
ane was provoked in immobilized rats with an
ric current and by traumatizing the duodenum.
croscopic changes in the gastric mucous mem-
, which were observed 1 hr. after a 15-min.
lation of adult rats, included altered
-structure of the chief and parietal cells.
were alterations in the endoplasmic
ulum with decreased content of ribosomes
lterations of destructive nature in mito-
dria; chief cell nuclei were increasingly
philic and had more pronounced condensation
cleoprotein granules than was normal. Thus,
croscopic changes reflecting disturbances
bonucleoprotein synthesis developed during
arly stages of dystrophy. Alterations in
e protein synthesis were accompanied by
ological disturbances of regeneration;
ed protein metabolism was studied by the
of incorporation of ^{35}S of amino acids.
oefficient of mitotic activity was changed
alteration of the various mitotic phases.
of transition of the cell from the inter-
ic condition into mitosis during ribo-
oprotein synthesis suggested a disturbance
is process. Three hr. after stimulation,
ic disturbances increased and were of a
tive local character; at this time,
biotic changes could even be observed by
microscopy. There was a clear vascular
ion, characterized by focal infiltrations
iapedesis. Hexamethonium prevented reflex
rophy only in a dose of 10 mg/kg, which
ed sympathetic ganglia. In addition,
atholytics and guanethidine were effective,
nting the development of neurogenic distur-
s. Electrical stimulation of the hypo-
amus produced destructive changes in the
ic mucous membrane in rabbits which were
ar to those already described. These de-
ctive changes could be prevented by resection
e vagus nerve below the diaphragm and by
reliminary admin. of phenobarbital.
ently, upon excessive stimulation of the
exogenic zone, the impulses, entering
gh the activated reticular formation, greatly
te the sympathetic centers, which are located
e hypothalamus. From this region the flow
of impulses pass by way of the sympathetic nervous system and produce alterations in the gastric mucous membrane.

9216 GASTRIC HYPOTHERMIA FOR DUODENAL ULCER. A LONG-TERM CONTROLLED STUDY. (E.) Harrell, W. R. (VA Hosp., Dallas, Tex.), H. Rose, J. S. Fordtran and B. Friedman. J.A.M.A. 200(4):290-294, 1967.

A total of 52 patients with active duodenal ulcer were randomly divided into 2 groups. The controls were "sham frozen"; this group consisted of 24 persons (23 males, 1 female) 30-84 yr. old, with an av. of 46.5 yr.; duration of ulcer symptoms ranged from 2-20 yr., with an av. of 11.7 yr.; 8 (33%) had previous hemorrhage, 2 (8%) had previous perforation; the av. basal acid secretion was 123 ml/hr. or 5.2 mEq/hr., and av. max. acid output was 298 ml/hr. or 29.2 mEq/hr. The hypothermia group received a standard gastric freezing procedure; this group consisted of 28 patients (27 males, 1 female), 22-67 yr. old, with an av. age of 43.4 yr.; duration of symptoms ranged from 1-30 yr., with an av. of 10.8 yr.; 14 (50%) had previous hemorrhage, 3 (11%) had previous perforation; the av. basal acid secretion was 116 ml/hr. or 4.6 mEq/hr., and the av. max. acid output was 305 ml/hr. or 31.8 mEq/hr. All patients were followed for a minimum of 18 mo.; both groups experienced symptomatic improvement. The degree and duration of symptomatic improvement was greater in the hypothermia group, and the results were statistically significant at 3 and 6 mo. Depression of basal acid secretion was transient, but significant depression of the max. acid output was observed after hypothermia, and this lasted for 6 mo. There was no correlation between clinical improvement and altered gastric secretory function. Antibodies against gastric mucosa were not demonstrated. While the benefits of gastric hypothermia appear definite, it is suggested that the brief duration of clinical improvement does not justify the use of this method.

9217 PARATHYROID FUNCTION IN PATIENTS WITH PEPTIC ULCER. (Pol.) Chojecki, Z. (Postgrad. Inst. Gastrology, Warsaw), K. Chrostowski and J. Dobrowolska. Pol. Tyg. Lek. 21(32):1220-1223, 1966.

Serum Ca, serum P and serum alkaline phosphatase were determined in 40 gastric ulcer patients, 40 duodenal ulcer patients and 20 controls. In addition, creatinine clearance, P clearance (C_p), phosphate excretion index, tubular reabsorption of phosphate, P glomerular filtration rate and serum albumin levels were determined in 20 gastric ulcer patients, 20 duodenal ulcer patients and 10 controls. The results of most of these biochemical tests were within normal limits. Serum Ca levels and serum P levels were within normal limits. Serum α_2- and β-globulin fractions were not elevated, indicating these patients were not hyperthyroid. Renal P clearance was increased in 30%, while tubular reabsorption of phosphate was decreased in 60% of the ulcer patients. The phosphate excretion index was elevated in these patients and in 15% was close to pathologic values. It is concluded that these disturbances of P metabolism in the kidneys are not sufficient proof of a relationship between parathyroid hyperactivity and peptic ulcer. It is assumed that some unknown biological factor influences the absorption of P in the renal tubules in peptic ulcer patients.

9218 THE ROLE OF DOSAGE FORM IN ASPIRIN-INDUCED GASTROINTESTINAL BLEEDING. (E.) Leonards, J. R. (Western Reserve U. Sch. Med., Cleveland, Ohio) and G. Levy. Clin. Pharmacol. Ther. 8(3):400-408, 1967.

Two types of aspirin tablets were used: A contained 0.32 g finely-milled aspirin (80 mesh or finer) per tablet; B contained 0.32 g relatively coarse aspirin (all particles greater than 20 mesh) per tablet. There were 6 healthy subjects in the absorption studies (5 females, 1 male, 23-41 yr. old, av. 28). Each received 2 tablets of Types A and B, resp., 1 wk. apart. The tablets were swallowed whole in 200 ml. water on an empty stomach in the morning; no food was taken for 2 hr.; blood samples were taken at 10, 20, 30, 60, 120, 240, and 360 min. after admin. the conc. of total salicylate in the plasma was determined and % of admin. dose at a given time was calculated from this. Gastrointestinal blood loss studies were made on 7 males and 5 females (19-32 yr., av. 24) with no history of gastrointestinal disease and with normal hematocrits. Venous blood (20 ml) was withdrawn from each subject, mixed with 10 ml (anticoagulant acid citrate dextrose) soln. containing 300 μc ^{51}Cr, and reinjected after incubation for 30 min. at 37°C. Stools were collected from 3-50 days and divided into six 8-day periods alternating control and tablet days. Blood in stools (ml) was calculated as (cpm/g stool homogenate)/multiplied by (cpm/ml blood) (wt. of stool homogenate). Subjects took 3 tablets (either fine, coarse, or placebo), 4 times a day, followed by 120 ml water. Aspirin in A tablets dissolved and was absorbed considerably more rapidly than that in B. There was significantly more gastrointestinal bleeding during admin. of aspirin than in control periods. There was no statistically significant difference in bleeding caused by the 2 types of tablets. There was a statistically significant correlation between normal blood loss in control- and placebo-admin. periods. Subjects who bled the most in control periods did not necessarily do so during aspirin admin.

9219 STRESS ULCERS: A SURVEY OF THE EXPERIENCE IN A LARGE GENERAL HOSPITAL. (E.) Grosz, C. R. (State U. New York, Brooklyn) and Wu, K-T. Surgery 61(6):853-857, 1967.

Case histories of 61 patients with upper gastr intestinal bleeding, and clinically demonstrat stress ulcers, but who were admitted for other conditions, were collected from 2346 case hist ies accumulated over a 5-yr. period. During t same 5 yr. covered by the histories, 352 stres (acute) ulcers were found at autopsy of 5669 patients, 188 males (126 gastric and 62 duoden and 164 females (118 gastric and 46 duodenal). Stress ulcers were most prevalent among patien 56-65 yr. old. It is concluded that the condi tion is more common than generally believed, a should receive aggressive prophylaxis.

9220 SIMPLE GASTRIC ULCER--A RADIOLOGICAL SURVEY. (E.) Cahill, P. (St. Vincen Hosp., Sydney, Australia) and W. B. Hennessy. Med. J. Aust. 1(5):166-169, 1967.

A study of 100 patients (69 women, 31 men) wit 107 ulcers revealed that peak incidence in wom occurred earlier (23% at 41-50 yr.) than men (13% at 51-60); overall peak incidence occurre at 41-50 yr. There was no sex difference in ulcer location. The main conc. of ulcers was found just below the junction of the middle- a upper-thirds of the stomach, and there was a smaller group of ulcers in the prepyloric zone Of the 107 ulcers, 81 (75%) occurred in the upper half of the stomach. The majority were situated on or adjacent to the lesser curvatur There were 29 giant ulcers (diameter greater t 3 cm), 18 in women, 11 in men. Distribution w essentially the same for both sexes, and the overall distribution of giant ulcers closely resembled that for the entire series.

9221 A PEPTIC ULCER FAMILY. (E.) Yang, T.-H. (Natl. Taiwan U. Hosp., Taipei) J.-L. Sung and Y.-Y. Hsieh. J. Formosan Med. Ass. 66(3):135-142, 1967.

9222 A LARGE ULCER OF THE GREATER CURVATUR OF THE STOMACH SIMULATING CORONARY INSUFFICIENCY. (E.) Iconomidis, M. G. Int. Surg. 48(2):149-153, 1967.

9223 IMMEDIATE AND LATE PROGNOSIS FOR HEMORRHAGES OF GASTRODUODENAL ULCER. (STATISTICS ON 200 PERSONAL CASES). (Fr.) Tête, R., J.-C. Evreux, Venet and A. Vachon. Rev. Lyon. Med. 16(11):452-461, 1967.

9224 GASTROCOLIC FISTULA SECONDARY TO BEN ULCER IN A PATIENT GIVEN STEROIDS. REPORT OF A CASE. (E.) Agus, H. (Maimonides Med. Ctr., Brooklyn, N. Y.) and J. Estrin. Amer. J. Dig. Dis. 12(7):742-746, 1967.

9225 DO CORTICOSTEROIDS CAUSE PEPTIC ULCER ANOTHER POINT OF VIEW. (E.) Menguy

Chicago Hosp., Ill.). Amer. J. Dig. Dis.
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DUODENAL ULCER. (E.) Craig, O. (St.
y's Hosp., London), T. Hunt, J. J. Kimerling
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57.

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CHRONIC DUODENAL ULCER. (E.) Priestley,
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PLASMA, PRESERVED FOR A PROLONGED PERIOD,
BLOOD COAGULOGRAM AND PROTEINOGRAM IN PEPTIC
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mat. 12(7):34-40, 1967.

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Rider, J. A. (Franklin Hosp., San
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Rev.) Paulino, F. (U. Brazil, Rio De Janeiro).
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34 A STUDY BASED ON EARLY COMPLICATIONS OF
242 CASES OF LATE COMPLICATIONS OF 100
ASES OF GASTRIC RESECTION FOR DUODENAL ULCERS.
Turk.) Yaycioğlu, A. (U. Ankara, Turkey), M. C.
nat and K. Guven. Tip Fac. Mec. (Ankara)
9(4):793-801, 1966.

35 FREQUENCY OF GASTRODUODENAL ULCER IN
RHEUMATOID ARTHRITIS DISEASE. (It.)
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osp., Turin, Italy), M. Roque Molina and M.
iara. Reumatismo 19(2):95-101, 1967.

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9240 TREATMENT OF THE PERFORATED PEPTIC ULCER. (Sp.) Alegria, B., E. (Obrero Gen. Hosp., Lima), C. Ostolaza N., J. Garcia-Calderon and E. Napaico G. Acad. Peru Cir. 19(1): 27-31, 1967.

9241 REHABILITATION AFTER GASTRECTOMY DUE TO GASTRIC OR DUODENAL ULCER. (Ger.) Gaudenz, R. (U. Zurich). Praxis 56(28):975-981, 1967.

9242 HEMORRHAGES FROM GASTRIC AND DUODENAL ULCERS WITH RESPECT TO THE SEASON OF YEAR. (Gr.) Symeonidis, J., A. Grigoriadis, K. Tsokhas. Galenus 9(2):93-101, 1967.

9243 DUODENAL ULCER TODAY. (E.) Pops, M. A. (UCLA Sch. Med., Los Angeles, Calif.), W. H. Bachrach, W. F. Barker, A. Cooke, G. M. McDonnel, S. M. Mellinkoff, D. G. Rimer and D. Soghor. Ann. Intern. Med. 67(1):164-182, 1967.

9244 GASTRIC TUBERCULOSIS WITH ULCERIFORM CLINICAL SYNDROME IN TWO PATIENTS WITH AN HEREDITY OF ULCER. (Fr.) Dubarry, J. J. (St. Andre Hosp., Bordeaux, France), J. Carles, J. P. Bernard, J. Faivre, E. Dubarry and P. Mineur. Arch. Mal. Appar. Dig. 56(5):435-442, 1967.

9245 A METHOD OF FORMATION OF EXPERIMENTAL GASTRIC ULCER IN CATS. (E.)

Iuldasheva, M. Kh. (Pavlov Inst. Physiol., Leningrad, USSR). Bull. Exp. Biol. Med. 62(11): 1324-1326, 1966. [Transl. Biull. Eksp. Biol. Med. 62(11):122-124, 1966.]

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9246 CLINICAL ANALYSIS OF 50 CASES OF DRUG-INDUCED ULCERATIONS OF THE STOMACH AN DUODENUM. (Pol.) Batko, B. (City Hosp., Gliwi Poland). Wiad. Lek. 20(11):1047-1051, 1967.

7 STATISTICAL STUDIES OF THE INCIDENCE OF
INTESTINAL TUBERCULOSIS AND REGIONAL
ERITIS IN THE LIGHT OF IMPROVED DIFFERENTIAL
GNOSTIC CRITERIA. (It.) Bettinelli, G.
ggiore Hosp., Milan, Italy) and G. Cosmacini.
z. Int. Med. Chir. 72(6):505-512, 1967.

eview of the diagnostic records of a large
/ hospital showed that the recorded incidence
Crohn's disease, as compared to Koch's
ocecal tuberculosis, was 1:19 for the yr.
l-1945, inclusive. For the yr. 1961-1965, it
14:1. Review of X-ray and histopathologic
ords of the later group appeared to confirm
much of the difference might be due to
roved diagnostic technics and differential
gnostic criteria.

CROHN'S DISEASE. (Nor.) Gjone, E.
(State Hosp., Oslo). T. Norsk.
geforen. 87(9b):911-914, 1967.

ng the period 1956-1963, 73 cases were
lied varying by yr. from 4-16 with an annual
dence of 1.1-4.4/million population. Patients
ed from 10-79-yr. old with 58 being between
nd 59-yr.; 37 were males and 36 females.
ferent geographical areas showed differences
ncidence, varying from 1.9-3.5 in annual
dence/million population with an av. of
million population/yr. for all areas for the
od 1956-1963. Symptoms and some findings
: mild abdominal pain (in 42 cases); strong
minal pain (20); periodic fever under 38.5°C
; periodic fever 38.5°C and over (3); diarrhea,
than 5 stools/day (31); diarrhea, 5 or more
ls/day (7); definite weakness (29); occult blood
; macroscopic blood in the stool (2); subileus
); ileus (15); peritonitis (1); and palpable
ominal filling (26). Crohn's disease can be
alized in almost any region of the intestine.
these 73 patients, X-ray, operation or both,
ated the disease; in the ileum only (42); the
minal ileum and cecum (15); ileum and jejunum
; jejunum alone (5); the terminal ileum and
er parts of the colon except the cecum (5).
gle fistulas occurred in 15 cases to 5
ferent structures; 9 multiple fistulas were
nd to 2-5 structures each in a total of 11
uctures (such as rectum, vagina, etc.). These
ients were treated by (1) medicinal therapy
ne (15), 7 symptom-free, or better, 4
unchanged or worse, 3 dead, and 1 unknown; (2) primary resection (41), 34 symptom-free or better, 4 unchanged or worse, 3 dead; and (3) primary bypass (16), 3 symptom-free or better, 11 unchanged or worse, 2 dead. Although the total number of cases were few (73) it seems that treatment by resection is most favorable. Secondary infections must be treated and vitamin B_{12} inj. may become necessary.

9249 GRANULOMATOUS HEPATITIS ASSOCIATED WITH REGIONAL ENTERITIS. (E.) Maurer, L. H. (Dartmouth Med. Sch., Hanover, N. H.), R. W. Hughes, Jr., J. H. Folley and W. T. Mosenthal. Gastroenterology 53(2):301-305, 1967.

9250 SOME ASPECTS OF CROHN'S DISEASE. (E.) Schofield, P. F. (Roy. Infirm., Manchester, England.) Dis. Colon Rectum 10(4): 262-266, 1967.

9251 REGIONAL ENTERITIS: REPORT OF A CASE. (E.) Lewis, M. I. (Queen of Angels Hosp. Surg. Clin., Los Angeles, Calif.). Dis. Colon Rectum 10(4):273-281, 1967.

9252 PROBLEMS OF THE OCCLUSIVE FORMS OF REGIONAL ENTERITIS. THREE CASES. (Fr.) Lapeyrere, J., P. Davidovitch and G. Moreau. Arch. Franc. Mal. Appar. Dig. 56(5):443-450, 1967.

9253 TOXIC DILATION COMPLICATING CROHN'S DISEASE OF THE COLON. (E.) Schachter, H. (U. Chicago, Ill.), M. J. Goldstein and J. B. Kirsner. Gastroenterology 53(1):136-142, 1967.

9254 REGIONAL ENTERITIS. (CROHN'S DISEASE LOCALIZED TO THE COLON.) (Nor.) Hertzberg, J. (Ulleval Hosp., Oslo). T. Norsk. Laegeforen. 87(9b):914-916, 1967.

9255 PYODERMA GANGRENOSUM IN ASSOCIATION WITH REGIONAL ENTERITIS. (E.) Stathers, G. M. (U. Sydney, Australia), L. G. Abbott and A. E. McGuinness. Arch. Derm. (Chicago) 95(4):375-380, 1967.

9256 HISTOCHEMICAL LOCALIZATION OF INTESTINAL DISACCHARIDASES: APPLICATION TO PERORAL BIOPSY SPECIMENS.

(E.) Jos, J. (Hosp. Sick Children, Paris), J. Frézal, J. Rey and M. Lamy. Nature (London) 213(5075):516-518, 1967.

The technic of Dahlqvist and Brun is described. Intestinal biopsies was obtained from 4 normal children, 5 patients with sucrose and isomaltose intolerance, from guinea pigs, and rats. Chromogenic reagent was prepared by a soln. in phosphate buffer (pH 6.5; 0.1 M) with different reagents. Substrate soln. were made with palatinose, lactose or sucrose/ml of distilled water. Mounted sections were placed on a tissue culture vessel lid and a conc. soln. of glucose oxidase were put on each; they were then moistened with chromogenic reagent. The vessel containing chromogenic reagent and the appropriate substrate soln. was closed and incubated for 3-6 hr. at 37°C, giving brown stain. Some sections were treated before incubation with sulfhydryl inhibitors to inhibit nonspecific staining of sulfhydryl compounds. Results of this procedure were similar in normal human duodenal mucosa and guinea pig mucosa, whether maltose (giving a stronger reaction), palatinose or sucrose was used as substrate. The precipitate was accurately localized in the brush border of the villous epithelial cells, whereas staining was absent or weak, in the cytoplasm. No staining occurred in the crypts, but precipitate was found in some cells of the lamina propria. Trehalase activity was also intense in the brush border, but the reaction was rather localized near the tip of the villi. With lactose as the substrate, a stain was obtained in both the brush border and apical cytoplasm of the villous epithelial cells. Control sections of human and guinea pig material incubated without substrate gave consistently negative results, whereas rat sections incubated the same way developed a stain (nonspecific, blocked by previous treatment with p-chloromercuribenzoate) throughout the cytoplasm of the epithelial cells. Sections from tissue without disaccharidase activities failed to react significantly. Intestinal biopsies of patients with congenital sucrose and isomaltose intolerance had normal trehalase and lactase activities, but reacted weakly with maltose and not at all with sucrose and palatinose. This technic shows that the disaccharide-splitting enzymes are primarily, if not exclusively, localized in the brush border.

9257 GENETIC AETIOLOGY OF LACTOSE INTOLERANCE.

(E.) Ferguson, A. (Glasgow Roy. Infirm., Scotland) and J. D. Maxwell. Lancet 2(7508):188-190 & 191, 1967.

A 28-yr.-old male with diarrhea was found to have lactase (β-galactosidase) deficiency; his family (parents and 5 sibs) were investigated by lactose-tolerance tests and intestinal biopsy. Primary hypolactasia was found in 1 (28-yr.-old) sister, and a generalized disaccharidase deficiency (secondary hypolactasia), secondary to a collag disease, was found in another (32-yr.-old) sist In the proband, a biopsy specimen of the jejunu revealed normal mucosal histology and there wer no further symptoms after 4 mo. on a milk-free diet. The incidence of primary hypolactasia in 2 of 6 sibs with normal parents suggests that primary hypolactasia is hereditary, and that th pattern of inheritance is autosomal recessive.

9258 THE ULTRASTRUCTURE OF THE INTESTINAL MUCOSA IN CELIAC DISEASE.

(Ger.) Tichý, J. (Charles U., Hradec Kralove, Czechoslovakia), M. Hradský, V. Plachý and A. Peregrin Z. Ges. Inn. Med. 22(5):143-148, 1967.

Of 5 children studied, 3 had celiac disease, 1 had an acute attack 4 yr. before with recovery, and 1 had pneumonia without signs of malabsorpt syndrome. Jejunal mucosa biopsies were obtaine from the 5 patients, with the fifth as a contro the tissues were prepared for electron microsco In the 3 cases of celiac disease, changes were evident in the apical enterocyte organelles and in places of normal layering of the microvilli; the mitochondria were fewer and appeared withi the middle-third of the cytoplasm between the nucleus and the periphery. They were smaller than normal and the cristae presented a striate appearance. The cisternae of the endoplasmic reticulum were enlarged and more numerous. The intercellular spaces were widened and the basil membrane of the mucosa seemed to be thickened and infiltrated with plasma cells. These ultra microscopic changes were the same in the tissue of the 3 patients with acute celiac disease. T other constituent cell types of the mucosa, goblet cells, Paneth cells and argentaffin cell were in all cases normal and unchanged in appea ance. The patient that recovered from an acute attack 4 yr. previously showed some shortened, and some deformed, villi, as well as some empty spaces where villi had been. The enterocytes were richly supplied with mitochondria (more sc than the control); lysosomes were plentiful. These cells seemed cytologically normal.

9259 GALACTOSE MALABSORPTION IN THE ADULT.

(Ger.) Rommel, K. (Justus Liebig U., Giessen, Germany), K. Grimmel and E. Margolf. Klin. Wschr. 45(11):559-564, 1967.

In 3 patients with low or failing blood galacto levels (24 yr., 63 yr. and 34 yr. old) and no history of illness or present restricting condi tions, galactose loading tests (40 g galactose p.o.) were admin.; blood galactose levels were determined at 15-min. intervals up to 150 min., and also the galactose excretion after 3 hr. Glucose and lactose loading tests were also car ried out in 1 of these patients. Both glucose and galactose blood levels were determined at 15-min. intervals following the lactose loading

tase activity was measured in biopsies under
same conditions of conc. as obtained in the
estine. The determinations were made under
hly controlled conditions. The 24-yr.-old pa-
nt showed a peak blood level after oral loading
18-10 mg%; only 0.3 g% of galactose was excreted
the urine and lactase activity was normal. In
63-yr.-old subject peak blood galactose levels
e 14-17.5 mg% with urinary excretion of 0.3 g
er oral loading. Glucose-loading tests
g glucose each) showed normal increase of
od glucose from a fasting level of 120 mg% to
mg%. The 34-yr.-old subject had blood galac-
e peak levels of only 9-5 mg% after oral load-
while no galactose was found in the urine. In
24-yr.-old patient the amount of galactose
orbed from 40 g p.o. was 24% or just under 10 g,
reas an intraduodenal dose delivered by in-
ation (40 g) was 45% absorbed (18 g). Renal
eshold for galactose seems to be about 10 mg%
od galactose level. Lactase activity of the
denal mucosa was normal in those cases, there
a small amount of galactose excreted and
ifference existed between p.o. and intraduo-
al loading. Galactose metabolism is apparently
faulty. The difference between oral and duo-
al loading suggests some action of oral or
tric secretion upon galactose to impede its
orption.

0 STUDIES ON NUMBER AND SEPARATION OF ENZYMES IN THE MUCOSA OF THE GASTRO-
ESTINAL TRACT. PART I. THE NORMAL DISAC-
RIDASE CONTENT OF THE ADULT DUODENUM. (Ger.)

sen, H. T. (U. Kiel, Germany), H. C. Drube,
E. Klein and K. Zielke. Gastroenterologia
sel) 106(6):345-356, 1966.

psies (10 each) were obtained from the
erior-, median- and inferior-thirds of the
denum from 30 healthy subjects fasted for a
imum of 8 hr. and were obtained from the
denal bulb. The wt. of the mucosal biopsies
ied from 8-30 mg. They were frozen at -20°C;
ts showed no diminution of enzyme activity in
frozen tissues within 1 wk. The tissue was
ogenized in physiologic saline at low temper-
re; the homogenate was centrifuged; the super-
ant diluted according to the enzyme conc. (in
al runs) with 0.9% NaCl. The maltase, inver-
e, lactase, and cellobiase activities were
ermined at a pH of 5.8 with an incubation
iod of 60 min. at 37°C. The reaction was halted
placing the test tubes in a boiling-water bath;
glucose released from the specific disac-
ride was then determined. The enzyme activities
e expressed in U; one U of disaccharase activity
rolyzes 1 μM of substrate/min. (at substrate
c. of 0.028 M, 37°C and optimal pH). These U
then given/g of protein in the tissue. The
conc. for the 4 enzymes in descending order
magnitude was maltase invertase, lactase and
lobiase, for all duodenal regions. The conc.
all enzymes were least in the duodenal bulb
greatest in the inferior-third, gradually
reasing from the proximal to the distal end of
the duodenum (a slight variation in invertase occurred in the 2 middle positions. The av. number of U of lactase/g of protein were: duodenal bulb, 2.7; upper-third, 9.0; middle-third, 20.3; and lower-third, 46.6. In the lower-third the av. number of enzyme U for 10 individuals were: Maltase, 217.1; invertase 85.8; lactase, 46.6; and cellobiase, 11.6. A number of individuals showed considerable variation in values for 1 or more of the disaccharidases. Four with low av. for lactase had no milk intolerance.

9261 THE HISTOCHEMICAL LOCALIZATION OF INTESTINAL DISACCHARIDASES BY A NEW PROCEDURE. (Fr.)

Jos, J. (Hosp. Sick Children, Paris), J. Frézal, J. Rey, M. Lamy and R. Wegmann. Ann. Histochim. 12(1):53-61, 1967.

Biopsies of 15 children (1-8 yr. old) were tested for α-glycosidase activity; 6 had celiac disease with gluten intolerance, 5 had intolerances for saccharose and isomaltose, and 4 had other disorders but normal intestinal absorption. Intestinal samples of rat and guinea pig were tested by this method and compared to enzyme determinations made from tissue homogenates of the same intestines. The biopsies were immediately frozen in liquid N, sectioned, mounted on coverglasses and fixed in acetone at 4°C for 15 min. Each preparation was placed in a tissue-culture chamber with a layer of filter paper between the section and the soln. contained in the chamber; the coverglass rested upon the cover of the chamber. Three different soln. were used: 1) Phosphate buffer (pH 6.5 0.1 M) containing 5 mg/ml gelatin tetranitroblue-tetrazolium, 0.33 mg/ml, phenazine methosulfate, 0.05 mg/ml, and glucose oxidase, 0.2 mg/ml. 2) Four mg glucose-oxidase/ml of phosphate buffer (pH 6.5 0.1 M) only. 3) The individual soln. of disaccharides were each (100 mg/ml) in distilled water, except maltose (25 mg/ml) and trehalose (50 mg/ml). A drop soln. of (2) was placed on the section, the filter paper moistened with soln. (1) placed over the section, and 1 ml Soln. 1 and 0.1 ml Soln. 3 placed in the inverted chamber which was then closed, sealed and incubated 3-5 hr. at 37°C. A similar preparation, but with disaccharide soln. omitted, incubated for the same time, served as a control. Glucose, liberated by hydrolysis, caused a brown precipitate of formazan by reduction. The patients with saccharose intolerance had feeble saccharase activity, although the other enzymes were in normal conc. Those with celiac disease had a general deficit of all hydrolytic enzymes. The activity of α-glycosidases was localized in the brush border of epithelial cells.

9262 SERUM PRECIPITINS TO MILK, GLUTEN AND RICE IN TROPICAL SPRUE. (E.)

Bayless, T. M. (Johns Hopkins Hosp., Baltimore, Md.), J. S. Partin and J. C. Partin. Johns Hopkins Med. J. 120(5):310-316, 1967.

Subjects in Puerto Rico were divided into 4 groups: Group 1 consisted of 56 patients with untreated tropical sprue (16 mild, 23 moderate, 17 severe); Group 2A consisted of 30 patients from Group 1, restudied during complete or partial remission after treatment with folic acid (9), vitamin B_{12} (3), both (8), tetracycline (5), gluten-free diet (4), spontaneous remission (1); Group 2B consisted of 55 patients studied only after treatment with folic acid (14), vitamin B_{12} (4), tetracycline (3), a combination (34); Group 3 was composed of 9 patients with nonspecific self-limited diarrhea; Group 4 was composed of 104 (18-22 yr. old) normal controls. Precipitating antibodies to milk, gluten, wheat, rice and gliadin were identified by micro-immunodiffusion. Precipitins to one or more of the dietary antigens was found in 37.5% of Group 1 and in only 4.8% of the controls. The precipitins disappeared rapidly in most cases after therapy. Of 10 with serum precipitins after treatment, 9 had persistent steatorrhea and jejunal biopsy abnormalities. Antibodies in the sera of Group 1 and refractory Group 2 were probably due to increased permeability to dietary antigenic molecules of the damaged small intestine mucosa. These antigens, in turn, stimulated the demonstrated antibodies. The most frequently encountered antibodies were those to raw milk. There was no observed relationship between the presence of milk antibodies and symptoms of milk intolerance. In contrast to those with celiac disease, none of those with tropical sprue had precipitins to gliadin. It is concluded that precipitins to gliadin are characteristic of celiac disease.

9263 RAPID INTRAVENOUS SORBITOL LOADING TEST AND ITS "URINARY FRUCTOSE INDEX". PART I. URINARY FRUCTOSE CONCENTRATION IN A GROUP OF NORMAL SUBJECTS. (It.) Pannuti, F. (U. Bologna, Italy), O. Masiello, I. Spagna and V. Randi. Riv. Gastroent. 18(5):261-268, 1966.

Rapid i.v. sorbitol loading (1 ml of a 25% soln./kg body wt.) was performed in 20 normal subjects of both sexes (age 30-45 yr.), and urinary fructose conc. determined according to a modified Roe method every half-hr. for 4 hr. Av. urinary excretion of fructose was highest 0.5 hr. (38.471 μg) and 1 hr. (15.689 μg) after loading and lowest after 4 hr. (5.532 μg). In order to simplify matters and to provide a basic U for comparing urinary fructose values, the authors propose the use of an "urinary fructose index for sorbitol" (IFS) obtained according to the following formulas:

$$A_{mx} - B_{mm} = X \quad \text{and} \quad \frac{X \cdot T_{Bmn}}{1000} = \text{IFS}$$

where A_{mx} = max. conc. of urinary fructose; B_{mn} = min. conc. of urinary fructose; T_{Bmn} = time of B_{mn} (i.e., 30 min. = 0.5; 60 min. = 1; 90 min. = 1.5, etc.). Av. IFS was 122.71 in these patients; with 2 exceptions, values ranged from a min. of 103.87 to a max. of 153.7. Further application of the above test and proposed index to the field of human hepatic pathology will ultimately confirm their validity. The authors emphasize the importance of renal integrity inasmuch as the conversion of sorbitol to fruc at the urinary level involves the following 4 ponents: sorbitol, hepatic sorbitol dehydroge kidney, and urinary fructose. (See also #9264

9264 RAPID INTRAVENOUS SORBITOL LOADING T AND ITS "URINARY FRUCTOSE INDEX". P II. URINARY FRUCTOSE CONCENTRATION IN A GROUP SUBJECTS WITH HEPATIC CIRRHOSIS. (It.) Pannu F. (U. Bologna, Italy), I. Spagna, O. Masiello and V. Randi. Riv. Gastroent. 18(5):269-275,

Fifteen patients of both sexes (age 40-61 yr.) with clinical and laboratory evidence of hepat cirrhosis were subjected to rapid i.v. sorbito loading. Details of admin., collection of uri specimens, and urinary fructose determination are as described in the previous abstract. Av urinary excretion of fructose was highest 0.5 (23.53 μg) and 1 hr. (10.9 μg) after loading a notably lower than values observed in normal s jects for the same time periods. Minimum excr tion of fructose occurred after 3.5 hr. in pat with cirrhosis (6.64 μg) and after 4 hr. in no subjects (5.53 μg). The av. IFS (urinary fruc index for sorbitol) in cirrhotic patients was 54.21 as compared to 122.71 in normal subjects Among cirrhotic patients, only 2 had an IFS greater than 100. Although it is still too ea to affirm the clinical value of the above test and index system, results in this study differ clearly from those observed in normal subjects (See also #9263)

9265 LIVER ALDOLASE IN FRUCTOSE INTOLERAN (Fr.) Schapira, F. (Hosp. Sick Chil Paris) and J.-C. Dreyfus. Rev. Franc. Etud. C Biol. 12(5):486-489, 1967.

Biopsies of liver weighing 3-15 mg were immedi frozen; after homogenization in 30-100 vol. of ice water, activities of the aldolases were de mined by colorimetry. The activities of fruct kinase and glucose-6-phosphatase were also established. Results were reported in I.U. Li samples were obtained from 12 children with fructose intolerance, from children with norma fructose tolerance, and from embryonic and fet livers as soon as possible after death. Cryst line rabbit muscle aldolase was prepared for comparison. Inhibition of the aldolases by adenosine triphosphate (ATP) was studied in al samples. Antiserum developed in the hen was u for studies of inactivation of the aldolases. Activities of the normal livers in I.U. for fructose-1,6-phosphate aldolase were 8-14, for fructose-1-phosphate aldolase, 8-14; the ratio individual livers, fructose-1,6-phosphate aldo over fructose-1-phosphate aldolase equaled one The av. activities of liver from 12 children with fructose intolerance were for fructose-1, phosphate aldolase, 2.07, for fructose-1-phosphate aldolase, 0.408 and the ratio of the av. 5.5. Fructokinase and glucokinase activities the intolerant were normal or close to normal. The activity ratio of the fructose intolerant

ater than that of human fetal livers (2-4 mo.)
ch ranged from 2-3. Inhibition by adenosine
phosphate of the liver aldolases of the fructose
olerant (30%) was almost equal to the av. for
nal human liver aldolase (12%) and human muscle
olase (45%) or to the av. of ATP inhibition
aldolases in rabbit liver (5%) and rabbit muscle
%) for that matter. Inactivation of the same
ymes by the antiserum of the hen was of the
e order. These results suggest 2 possible
nogenic mechanisms: 1) the persistence of a
atively high level of the embryonic aldolases;
2) a mutation repressing the aldolases which
ntually normally become predominant.

IMMUNOLOGIC PROBLEMS IN CELIAC DISEASE
AND THE INTOLERANCE TO COW'S MILK IN
LDREN. (Fr.) Lalande, J.-A. (Broussais Hosp.,
s), B.-N. Halpern, N.-T. Ky, J. Frézal and
Rey. Rev. Franc. Allerg. 7(2):65-75, 1967.

dren (66, up to 4 yr. of age) without any
estive tract disorders and with no history of
rrhea or dehydration served as controls in
se immunologic tests. Children with celiac
ease (29) and intolerance to cow's milk (6)
e tested by a specific, passive hemagglutination
t for the presence and levels of antibodies
inst gliadin and against the proteins of cow's
k. The specific antigen was fixed on rabbit
by the benzidine reaction; the degree of
agglutination produced by the addition of
um containing antibody was quantitative and
roducible. Antigenic rabbit blood specific
gliadin of wheat, casein of milk, α-lactalbumin,
actoglobulin, bovine serum albumin and bovine
unoglobulins and specific for the soluble
ctions was developed. Among the controls
ibodies were found in 4 children 6-18 mo. old
inst gliadin. Only one of the controls pos-
sed antibodies against cow milk casein. Anti-
es against the "soluble fractions" were found
3 of 25 cases. Antibodies against β-lacto-
bulin were found in 4 of 6 cases. In the celiac
ease group, antibody titer against gliadin
highly significant in 15 of 29 cases. Six
e followed after ommission of gliadin from
diet; 3 showed progressive decrease in anti-
y titer; two had retained very high antibody
r. Hemagglutinations were positive in one
ent with celiac disease against casein and
inst the "soluble fractions" in 12 of 15
dren; 6 had antibodies against β-lactoglobulin.
the 6 with intolerance to cow's milk, 3 had a
um antibody titer against casein; all showed
gh titer, 1/512 or greater, against the
uble fractions". The titer against β-lacto-
bulin was always constant. No antibody against
adin was found in these 6 cases of milk in-
erance.

LACTOSE INTOLERANCE IN HEALTHY CHILDREN.
(E.) Huang, S. S. (Johns Hopkins U.
Med., Baltimore, Md.) and T. M. Bayless.
Eng. J. Med. 276(23):1283-1287, 1967.

Caucasian and Negro children (20 each and between 11 mo. and 11 yr. of age) were studied. Milk-induced symptoms and positive family histories of milk and lactose intolerance were more frequent in Negro children; milk intolerance in 14 of the 20 Negroes and in 2 of the 20 Caucasians. Three Negro and 1 Caucasian child had histories of abdominal cramps following milk ingestion. Lactose loading caused abdominal discomfort in 7 Negroes and 2 Caucasians, including the 4 with milk intolerance. Peak levels of blood sugar with the lactose tolerance tests were less than 26 mg% in 7 of the 9 children with intolerance, and in 1 of the 31 lactose-tolerant children. Glucose-galactose tolerance was normal. It is concluded that lactose intolerance probably reflected intestinal lactase deficiency in most of the children studied. A gradual decrease of lactase activity after weaning was suggested by the fact that lactose-induced symptoms increased with age in both Negro children and Negro adults. Racial differences noted in this study are said to be consistent with the hypothesis that an hereditary intestinal lactase deficiency underlies the milk intolerance found in some adults.

9268 AN IMMUNOLOGIC STUDY OF CELIAC DISEASE WITH REFERENCE TO 38 CASES. (Fr.)
Roy, C. (Hosp. Sick Child., Paris), J. Lalande, J. Frézal, J. Rey, M. Lamy and B. Halpern. Path. Biol. (Paris) 15(7-8):384-390, 1967.

Circulating antibodies against gliadin and other food proteins were determined in 38 children with celiac disease, 170 normal children without any history of intestinal disorders, 18 convalescents of gastrointestinal fever and 6 children with intolerance to cow's milk. Tests (151) were made in 18 families of the 38 children with celiac disease; 8 families were studied in particular. The antibody level was determined by a quantitative passive hemagglutination technic. Used as antigens were: An alcoholic extract of wheat gluten suspended in glycerol, a protein extract from rice, a β-lactoglobulin preparation, and casein prepared by acid precipitation. Both casein and β-lactoglobulin were preserved after lyophilization of this preparation. In 11 cases (6.5%) some agglutination occurred with gliadin among the 170 controls; only 1 of 89 tested had some antibody conc. against β-lactoglobulin. Some reaction against the rice proteins (3% or less dilatation) occurred in 52 of 55 children studied. No increase of antibody levels against gliadin were observed in the 18 who recovered from gastrointestinal fever or in the 6 children with intolerance to cows' milk. The patients with celiac disease had changing levels of antibodies against gliadin depending, upon the duration on gliadin-free diet. Eleven were examined before treatment: 6 had antibodies against gliadin, 4 of these with very high titers; 2 had antibodies against β-lactoglobulin and casein and 1 against rice protein. Antibody titers against gliadin occurred in 15 others in the group, 11 of them were very high; 4 of 20 had β-lactoglobulin antibodies, and 3 of 21 had antibodies against casein. After 3 mo. on a gliadin-free diet, only 1 of 15 who had had antibodies against gliadin still exhibited antibody reaction. The antibodies against the other food proteins showed a corresponding decrease with time of abstinence. Reintroduction of the specific proteins showed that the antibodies against gliadin appeared more rapidly than the other antibodies, suggesting a different mechanism of formation. In some families of the celiac disease patients members had antibody titers against gliadin; in other families no antibodies were discovered.

9269 FAT ABSORPTION BY THE SMALL INTESTINE OF X-IRRADIATED MICE. (E.) Dulcino, J. (Ctr. Study Nucl. Energy, Mol, Belgium), J. R. Maisin and J. Deroo. Int. J. Radiat. Biol. 12(1): 93-96, 1967.

Mice were given either a diet of 5 parts of condensed milk 1 part of water and 1 part of salad oil or a fat diet of 20 ml of salad oil and 500 mg tripalmitate or palmitic acid. ^{14}C-Glyceryl-tripalmitate (0.5 μc) or palmitic acid (0.5 μc or 1 μc ^{3}H) made up 0.2 ml of these diets. To avoid gastric retention in the irradiated mice the diet was inj. directly into the duodenum after laparotomy. For each diet 4 groups of mice were tested: 1) controls; 2) controls inj. with 8 aminoethylisothiuronium-Br-HBr (AET); 3) irradiated mice; and 4) irradiated mice inj. with AET 10 min. before irradiation. Mice were irradiated 3 days before inj. of diet with 1500 r of X-rays at a dose rate of 100 r/min. Subsequently, it was found that the type of diet (low or high fat content) did not affect the results. No difference was noted between Control Groups 1 and 2. Animals were killed at 4, 8, and 24 hr. following admin. of diet. The gastrointestinal tract was excised, opened and washed with physiological saline. Percentage absorption was calculated from the sum of the activities of the luminal contents and feces. Total activity of the gastrointestinal wall was determined in a liquid scintillation counter after digestion in hyamine hydroxide at 65°C. Glycerides, phospholipids and fatty acids were assayed by chromatography of extracts of the intestinal contents, feces, and gastrointestinal wall. Three days after a dose of 1500 r X-rays no significant difference existed with respect to absorption of ^{14}C-palmitic acid or of glyceryl-tripalmitate-1-^{14}C, or of ^{3}H-palmitic acid. More ^{14}C-labeled fatty acids were present at 6 hr. in the wall of the small intestine of the X-irradiated mice than in that of the non-irradiated controls; the mice protected by AET before irradiation had values for ^{14}C-labeled fatty acids in the intestinal wall intermediate between those of normal and irradiated nonprotected mice. By contrast, more ^{14}C-labeled triglycerides were found in the intestinal wall of the control than of the irradiated mice. ^{14}C-Labeled triglyceride levels of the protected irradiated mice were close to those of the intestinal wall of the controls. No differences were found with respect to phospholipids between groups. Intestinal contents showed a significant increase in triglycerides and phospholipids and a decrease in fatty acids after irradiation.

9270 ABNORMAL BILE-SALT PATTERNS AND INTESTINAL BACTERIAL OVERGROWTH ASSOCIA WITH MALABSORPTION. (E.) Rosenberg, I. H. (Boston City Hosp., Mass.), W. G. Hardison and D. M. Bull. New Eng. J. Med. 276(25):1391-1397 1967.

Thin-layer and gas chromatographic studies, per mitting accurate separation and estimation of conjugated and unconjugated bile salts, were us in this study of 2 men (59 and 65 yr. old) and 12 controls to learn whether unconjugated bile salts participate in the pathogenesis of the ma absorption syndrome which is seen in the presen of bacterial proliferation in the upper small intestine. The 2 patients presented with steat rhea and considerable bacterial overgrowth in t upper small intestine. Unconjugated bile salts in the intestinal fluid were identified as unconjugated cholic acid, deoxycholic acid and chenodeoxycholic acid although the conc. of unconjugated bile salts was low (rarely more thar 10% of total), the deoxycholic conc. in 1 patient was similar to the amount reportedly four to be toxic to intestinal transport processes in vitro. Conjugated bile salts were metaboliz when incubated with jejunal fluid from these patients, with in vitro degradation of 60-80% the total content of ^{14}C labeled taurocholate, as compared to degradation of only insignificar amounts of taurocholate by intestinal fluid der from normal controls. Erythromycin therapy improved absorption of both fat and vitamin B_{12}, and also resulted in the disappearance of unconjugated salts from the jejunal fluid, which was no longer capable of degrading taurocholat in vitro.

9271 DIARRHEA AND STEATORRHEA IN DIABETES. (Fr.) Duret, R. (St. Pierre U. Hosp Brussels), P. Mainguet and O. Thys. Acta Gastroent. Belg. 30(4):313-328, 1967.

9272 MULTIPLE JEJUNAL BIOPSIES IN ADULT CELIAC DISEASE. (E.) Roy-Choudhury D. C. (United Birmingham Hosp., England), W. T Cooke, J. G. Banwell and B. J. Smiths. Amer. J. Dig. Dis. 12(7):657-663, 1967.

9273 ABNORMALITIES OF HIGH DENSITY LIPOPROTEINS IN ABETALIPOPROTEINEMIA. (E.) Jones, J. W. (U. Washington Sch. Med., Seattle) and P. Ways. J. Clin. Invest. 46(7): 1151-1161, 1967.

9274 D-XYLOSE TEST IN THE PREMATURE. (It Ansaldi, N. (U. Turin, Italy), S. Baratono and R. Ballario. Minerva Pediat. 19(21):1005-1010, 1967.

STUDIES ON DEFICIENCY AND ABSORPTION OF FOLATES IN PATIENTS ON ANTICONVULSANT . (E.) Ibbotson, R. N. (Inst. Med. Vet. Adelaide, S. Australia), B. A. Dilena and Horwood. Aust. Ann. Med. 16(2):144-150,

JEJUNAL BIOPSY FINDINGS AND ABSORPTION OF D-XYLOSE AND VITAMIN A IN PATIENTS GASTROINTESTINAL DISEASES. (Nor.) Burhol, lleval Hosp., Oslo) and J. Myren. T. Norsk. foren. 87(14-15):1262-1268, 1967.

DIFFERENTIATION BETWEEN MALABSORPTION AND MALDIGESTION IN MALABSORPTION OME. (Ger.)(Rev.) Beck, K. (U. Clin. urg i. Br., Germany). Med. Klin. 62(27): 1066, 1967.

GENESIS OF OSTEOMALACIA FOLLOWING GASTROENTEROSTOMY. (E.) Thomas, , Jr. (U. Florida, Gainesville). Trans. Clin. Climat. Ass. 78:107-118, 1967.

EFFECTS OF INTESTINAL PARASITES ON IRON METABOLISM USING RADIOACTIVE (^{59}Fe). (Turk.) Tarcan, Y. (U. Ankara, ey). Tip Fak. Mec. (Ankara) 19(4):777-792,

ALDOLASE ACTIVITIES IN THE LIVER IN PARENTS OF PATIENTS WITH HEREDITARY TOSE INTOLERANCE. (E.) Raivio, K. (U. nki), J. Perheentupa and E. A. Nikkilä. Chim. Acta 17(2):275-279, 1967.

DISACCHARIDASES AND CONGENITAL OR ACQUIRED INTOLERANCE TO SUGARS. (Por.) lhães Carvalho, J. J. Pediat. (Rio de Janeiro) -4):62-86, 1967.

ABSENCE OF MILK ANTIBODIES IN MILK INTOLERANCE IN ADULTS. (E.) Bayless, T. M. (Johns Hopkins U. Sch. Med., Baltimore, Md.), J. S. Partin and N. S. Rosensweig. J.A.M.A. 201(1):128, 1967.

9283 MILK INTOLERANCE IN CHILDREN. (Fr.) Hennequet, A. (Paris Hosp.) and C. Ricour. Aliment. Vie 55(4-5-6):165-171, 1967.

9284 ELECTRON MICROSCOPY OF JEJUNAL MUCOSA IN WHIPPLE'S DISEASE. (Por.) Nagle, G. J. (U. Rio de Janeiro, Brazil). Arq. Brasil. Med. 54(1):4-15, 1967.

9285 PHYSIOPATHOLOGICAL STUDY OF GASTRODUODENAL RESECTION FOR ULCERS. I. ABSORPTION OF FATS AND PROTEINS. (It.) Stipa, S. (U. Catania, Italy), C. Brondi, A. Cavallaro, S. Musumeci and C. Loreto. Ann. Ital. Chir. 43(1): 27-77, 1966.

9286 PHYSIOPATHOLOGICAL STUDY OF GASTRODUODENAL RESECTION FOR ULCERS. II. DISTURBANCES TO THE SKELETAL SYSTEM. (It.) Stipa, S. (U. Catania, Italy), A. Cavallaro and G. Alessi. Ann. Ital. Chir. 43(1):78-117, 1966.

9287 EFFECTS OF BYPASS OF THE DISTAL FOURTH OF SMALL INTESTINE ON EXPERIMENTAL HYPERCHOLESTEROLEMIA AND ATHEROSCLEROSIS IN RHESUS MONKEYS. (E.) Scott, H. W., Jr. (Vanderbilt U. Sch. Med., Nashville, Tenn.), S. E. Stephenson, Jr., C. W. Hayes and R. K. Younger. Surg. Gynec. Obstet. 125(1):3-12, 1967.

9288 INTESTINAL DISACCHARIDASE DEFICIENCY IN THE SEA LION. (E.) Kretchmer, N. (Stanford U. Sch. Med., Palo Alto, Calif.) and P. Sunshine. Gastroenterology 53(1):123-129, 1967.

9289 CLINICAL PICTURE OF HARTNUP'S SYNDROME. (Ger.) Fazekas, A. (Szabol-Szatmer Hosp., Nyiregyhaza, Hungary), L. Szegö and J. Maácz. Derm. Wschr. 153(27):751-760, 1967.

9290 RADIOLOGIC ASPECTS OF INTESTINAL TUBERCULOSIS LOCALIZED IN THE ILEOCECAL TRACT AND COLON. (It.) Martinotti, G. (U. Parma, Italy), A. Cugini and G. Savino. *Riv. Pat. Clin. Tuberc.* 40(1):22-48, 1967.

The radiologic aspects of 7 personally-observed patients with intestinal tuberculosis subsequent to pulmonary tuberculosis are described. Group 1 comprised 4 patients observed in a period prior to the advent of chemo-antibiotic therapy. The principal radiologic findings consisted of: prevalent hypotonia of the ileal tract; irregular mucosa pattern with numerous areas indicating possible ulcerations; canalicular aspect of the terminal portion of the ileum with irregular contours and tortuous course; characteristic cone-shaped appearance of the cecum with retraction of the medial portion; irregular mucosal pattern of the cecum and colon; stenosis of the distal portion of the ileum; concentric, opaque bands around the medial margin of the cecum due to infiltration and ulceration of the ileocecal sphincter. At surgery, these patients showed ileocecal tuberculosis with ulcerocaseous, hyperplastic, pseudopolypous lesions and with internal fistula (1) or tuberculoma (1). Group 2 comprised 3 patients with tuberculosis of the intestine who had been treated with various chemotherapeutic agents and antibiotics. Here the radiologic findings are more individual and evident since they are not masked by inflammatory signs. Characteristic signs are ulcerative forms in an early stage without diffuse spread and the presence of tuberculomas or vegetations of modest size without marked deformation of the gastrointestinal tract.

9291 STUDY OF LARGE INTESTINE TUMORS BY BARIUM ENEMA. (Fr.) Candardjis, G. (U. Lausanne, Switzerland). *Schweiz. Med. Wschr.* 97(18):577-585, 1967.

Patients undergoing Ba enema examination are prepared by 2-3 days of a low-residue, semiliquid diet, followed by laxatives, before admin. of a dilute Ba suspension; both laxative and Ba suspension contained tannic acid (0.25% and 0.5%, resp.). Moderate distention of the colon with diluted Ba, continuous fluoroscopic control of the progression of the suspension, high-kilovoltage radiography (125-150 kV), and photography from several angles to visualize all portions of the colon without superposition, were used. Suspicious regions were photographed again with and without compression. The double contrast method was used only as a complementary procedure. The radiological appearances of small polyps, vegetating carcinoma, amebiasis, schistosomiasis, endometriosis of the colon, extrinsic tumors, radiation-induced lesions, short areas of stenosis, and the residual areas after colon resection are discussed, with several illustrations.

9292 THE DANGER OF HYDROGEN PEROXIDE AS A
COLONIC IRRIGATING SOLUTION. (E.)
Danis, R. K. (St. Louis U. Sch. Med., Mo.),
A. E. Brodeur and J. Shields. *J. Pediat. Surg*
2(2):131-133, 1967.

Evidence is presented which indicates that maj
O_2 embolism had occurred in an infant followir
irrigation of the distal colon with 15-20 ml c
dilute hydrogen peroxide. Within 2 min. cyanc
and swelling developed over the lower trunk ar
lower extremities. X-rays illustrated gross
filling of the hepatic portal system with gas.
The blood pressure was 50/0 and the pulse,
160/min. Bacteremia followed: blood cultures
grew *Escherichia coli* and *Pseudomonas aerugino*
Specific antibiotic and supportive treatment
resulted in complete resolution. Laboratory
studies with 10 dogs confirmed this clinical
impression of massive O_2 embolization with
temporary portal venous obstruction. Radio-
graphic studies on the isolated liver of these
animals following irrigation with 30-50 ml of
1% hydrogen peroxide showed air bubbles in the
mesenteric veins and lymphatics within 1 min.
the instillation of hydrogen peroxide which
persisted for 30 min. During this period, po
venous pressure rose from a normal of 2-3 mm
to 40-50 mm Hg. Roentgenogram of the excised
liver showed a clear outline of the portal
venous system filled with O_2 emboli. Inj. of
the biliary tree with 50% Hypaque showed the
gas to be outside the biliary tree.

9293 4-HYDROXY-3-METHOXYMANDELIC ACID (HM
IN THE URINE OF NORMAL AND FASTING S
JECTS AND IN PATIENTS WITH COLITIS. (E.)
Goodman, I. (Columbia U., New York City), A.
Olenczak and R. B. Hiatt. *Clin. Chim. Acta*
16(2):245-248, 1967.

An improved method for the assay of 4-hydroxy
methoxymandelic acid (an end product of cate-
cholamine catabolism found in elevated levels
pheochromocytoma and neuroblastoma) using pap
electrophoresis followed by two-dimensional
chromatography (butanol:pyridine:water, 5:3:3
butanol:acetic acid:water, 120:30:50) is de-
scribed. Urinary levels (1.3 µg/mg creatinin
from 27 humans on a varied diet were 25% great
as determined by this method than those in the
literature. In fasting subjects, the urinary l
of this compound, if present at all, was below
limits of detection. Mean urinary level for 8
patients with colitis was 1.0 µg/mg creatinine
Normal levels (2.0 µg/mg creatinine) were obta
in patients with pheochromocytoma and neurobla
but larger amounts of unidentified compounds w
observed. The results support the suggestion
the urinary presence of this compound in human
is dependent upon food intake, but a metabolic
role for it is not excluded.

INTRAPERITONEAL DRAINS IN SURGERY OF
THE COLON. CLINICAL EVALUATION OF 454
;. (E.) Berliner, S. D. (Long Island
;h Hosp., N. Y.), L. C. Burson and P. E.
Amer. J. Surg. 113(5):646-647, 1967.

;4 consecutive colectomies there was a
ficantly higher morbidity in patients with
leakage than in those without drainage. In
ients without drainage in whom an anastomotic
developed there was a single death. Among
ients with leakage who had i.p. drainage
were 3 deaths. Patients with extraperitoneal
age had anterior resections and the 10%
ence of leakage in these patients was not
kable. Leaks occurred almost as often in
nts with i.p. drainage and overall mortality
lmost 3 times greater than in the group
ut drainage. When an anastomotic leak
oped there was no mortality among patients
extraperitoneal drainage, 11% mortality in
patients without drainage and a 60%
lity among those with i.p. drainage.
peritoneal drainage appears to serve as an
ate vent when leakage occurs in an anterior
tion. In patients with i.p. drainage who
leakage the drain does not often often func-
effectively and the mortality is high.
clinical results resemble those obtained
e laboratory. An i.p. drain will not pro-
the suture line from leakage, it need not
nt a diffuse peritonitis and by its inter-
ion the drain may keep adjacent omentum or
tine from sealing an anastomotic leak.

USE OF CIRCUMFERENTIAL TANGENTIAL
CRYOSTAT SECTIONS OF THE INTESTINE IN
IAGNOSIS OF HIRSCHSPRUNG'S DISEASE. (E.)
, J. L. (Child. Hosp., Sheffield, England),
nch and J. Lister. J. Clin. Path. 20(3):
66, 1967.

hod is described for making cryostat sections
ctal or colonic biopsy specimens received
tly from the operating room and derived
patients with suspected congenital mega-
. Small liver slices, obtained from rou-
necropsies, were frozen onto the ends of the
chucks with cardice, ahead of time, and
iver cut down until the surface had the
ur of the cut of the microtome knife and
bsolutely smooth. Sections of the sample
e, approx. 1 cm^2 and cut in a direction
lel with the main muscle layers, were then
ed onto the cut surface of the frozen liver,
ose surface they froze immediately when the
was kept in cardice. The chuck was then
ted on the microtome so that the plane of
f the knife was exactly parallel to the cut
surface, prior to making repeated, serial
ons through the intestine at 10-15 μ and
g them off onto numbered cover glasses.
mens for immediate diagnosis were either
ned directly or after staining with
hrome Cyanin R.S. (0.2 g in 0.5 ml conc.
iluted with 95 ml distilled water and 5 ml
1% iron alum). An additional staining technic, which permitted more definitive study, involved incubation of the same cryostat sections with acetylthiocholine iodide as substrate, permitting enzymic hydrolysis of the carboxylic acid ester of thiocholine sulfate in the presence of a cupric ion complex, followed by precipitation of the liberated thiocholine sulfate as a copper mercaptide, made more conspicuous by treatment with dilute ammonium sulfide. Instead of a normal ganglionic plexus, consisting of a groundwork of nerve cells in which the nuclei stand out as pale, unstained areas, "aganglionic" bowel sections treated by this method showed large, deeply stained nerve trunks, forming a very conspicuous, coarse, irregular network.

9296 THE USE OF Althaea officinalis ROOT IN X-RAY INVESTIGATION OF THE LARGE INTESTINE. (Rus.) Perepelkin, B. G. (Kuibyshev Med. Inst., USSR). Klin. Med. (Moskva) 45(2):57-63, 1967.

The large intestine was examined in 140 patients with a Ba suspension which contained Althaea root extract (10 g for adults, 5 g for children) and the subsequent admin. of air. The Ba suspension of the contrast enema was prepared in the following manner: Althaea root extract powder was dissolved in 30-40 ml of warm water and then Ba (100 g) and 80-100 ml water were added; the amount of Ba gradually reached 400-500 g. After obtaining a creamy mass, the mixture was diluted with a regular Ba suspension (400 g Ba/1.5 liters of water); this was boiled and cooled to 37°. In this manner the conc. of Ba was doubled, improving the quality of the X-ray and increasing its contrast. Althaea facilitated a better adherence of Ba to the intestinal wall, thereby significantly facilitating detection of the smallest formations on the intestinal mucous membrane, including those with a diameter of 0.1-0.2 cm. This method provides a max. economy of the X-ray film and time of examination, and affords images of polyps in all sections of the large intestine. No side effects were attributed to the extract. This procedure also enhances recognition of villous and carcinoma tumors since it permits study of the thin structure of the surface of the neoplasms. Two case histories are given in detail.

9297 TRANSRECTAL NEEDLE BIOPSY OF EXTRARECTAL MASSES. (E.) Anderson, M. J., Jr. Surg. Clin. N. Amer. 47(4):989-997, 1967.

A total of 52 transrectal needle biopsies were performed on 48 patients with extrarectal masses which were not thought to have prostatic origins; correct diagnoses were obtained in 40 (77%) cases, and presumably repetition of the procedure would have afforded correct diagnosis in 10 more. The successful biopsies gave significant therapeutic guidance in all cases, and no important complications occurred. The findings of rectal biopsies were tabulated into 4 groups. In Group 1, distinguished by presence of a rectal shelf, 22 procedures were performed on 20 patients; histologic diagnosis was correct in 16; in 3, subsequent findings showed that a benign histologic diagnosis was incorrect. In Group 2 (possible local recurrence after surgery for carcinoma of the left colon or rectum), 12 procedures were done on 10 patients; the diagnosis was correct in 8. Within this group there were 4 false negatives, benign diagnosis later disproved. In Group 3 (extrarectal masses after malignant disease had been treated in other body regions), 8 procedures were performed on 8 patients; 6 resulted in correct diagnosis, all malignant. The other 2 were false negatives. In Group 4 (miscellaneous extrarectal masses of uncertain diagnosis), 10 biopsies were done on 10 patients; the tissue diagnoses were correct in each case. Histologic study revealed malignancy in 7 and benign conditions in 3. By this method correct diagnoses were obtained in 40 (77%) of 52 instances. The technic of transrectal needle biopsy of extrarectal masses is described in detail.

9298 APPENDICITIS. AN ANALYSIS OF TWO THOUSAND ONE HUNDRED SEVENTEEN CASES TREATED SURGICALLY IN A COMMUNITY HOSPITAL DURING A PERIOD OF TWENTY YEARS. (E.) Magee, R. B. (Altoona Hosp., Pa.), J. M. Stowell and R. C. MacDuffee. Penn. Med. 70(6):47-49, 1967.

Group 1 (inflamed) included histologic diagnosis of subacute, acute, acute suppurative, acute fibrinopurulent with periappendicitis, gangrenous and perforated. The noninflamed, Group 2, included tissue diagnosis of normal appendix, atrophic appendix and appendix with lymphoid hyperplasia. Those in Group 1 had a shorter duration of symptoms (36.6 hr.; 48.6 hr. for Group 2), a lower right quadrant onset (42%; Group 2, 59%), a lower right quadrant localization of pain and tenderness (71%; Group 2, 58%), and no localization of pain in 25%. The most typical feature in Group 1 was a shift of pain from anywhere to lower right quadrant (38%; Group 2, 24%). Previous similar attacks occurred in 42% of Group 1, 26% in Group 2. The groups could not be distinguished on the basis of direct tenderness, nausea or vomiting, constipation, or diarrhea. Rebound tenderness favored a diagnosis of inflammation in the appendix. Frequency of normal peristalsis was 52% in Group 1, 60% in Group 2, while that of hypoactive peristalsis was 42% and 27%, resp. WBC and segmented neutrophils increased with severity of disease, while lymphocytes decreased. For normal, subacute, acute, gangrenous and perforated, the 3 hematologic values, resp., were: 12,605, 15,800, 16,550, 18,085, 18,325; 71.6, 74.5, 76.1, 80.5, 81.7; 23.1, 18.8, 15.6, 13.6, 12.6. A 20% incidence of albuminuria was characteristic of both groups. WBC in the urine (more than 3/high power field) occurred in 15% in Group 1, 1.8% in Group 2. Of 29 X-rays in Group 1, 40% showed abnormality suggesting peritoneal irritation. In Group 1, appendectomy was performed 77% of the time, appendectomy + drainage in 17.5%, drainage only in 2.5%. In 1955-1964 there was a 30% increase in preoperative use of antibiotics. In tissue diagnosis, the appendix was acutely inflamed in 66%, gangrenous in 13%, perforated in 3%, subacute in 6%, noninflamed in 12%. In 1945-1954, 22% of appendices removed were normal; in 1955-1964, 7%. The wound infection rate was 50 for perforated, 20% for others in Group 1, none for Group 2. The crude mortality rate was 0.6% 1945-1954, 1.3% in 1955-1964; corrected rates were 0.5% and 0.9%, resp.

9299 THE QUESTION OF EARLY OPERATION FOR APPENDICITIS. (Ger.) Prinz, P. (Crivitz/Mecklenburg Hosp., Germany). Zbl. Chi 92(15):546-550, 1967.

Appendicitis was studied in a total of 852 cases. Of 726 patients operated upon early within 48 hr. of onset, 673 definitely had inflammatory signs (including 29 perforations), 50 showed no macroscopic signs of appendicitis, 2 had ovarian cysts and 1 presented a stomach perforation. In 103 operated upon 3-5 days after beginning of symptoms, the disorder prove to be certain in 94; no inflammation was found in 9 cases. In the 23 undergoing late surgery, the clinical diagnosis was proven in 18 instanc Of the total 852 cases, clinical diagnoses were correct 785 times and the mortality rate was 0.32%. This rate was least in the group operat upon early; therefore early surgery is necessar Mortality rates published on over 70,000 cases of appendicitis (general mortality 0.7%; simple acute appendicitis, 0.13%) agree with this statement. Diagnostic accuracy is highest in the early stage, the risk increases with time, and medical treatment, chemotherapeutics, antibiotics and prednisone can often cause a distorted picture of the inflamed appendix.

9300 BLOOD COAGULATION AND ANTICOAGULATION SYSTEM IN PATIENTS WITH ACUTE APPENDICITIS BEFORE AND AFTER THE OPERATION. (Rus.) Alimov, T. U. (Tashkent Med. Inst., USSR). Khirurgiia (Moskva) 43(3):84-88, 1967.

In the majority of 101 patients (70 women, 31 men; 15-90 yr. old) with acute appendicitis, prior to surgery normal values were found for prothrombin, plasma tolerance to heparin, recalcification time, thrombo-test, heparin time, proconvertin and clot retraction. In half the cases, fibrinogen was increased, and i almost half of the cases, fibinolytic activity was less than 14%. During surgery, performed on 97 patients, prothrombin, proconvertin, heparin time and thrombo-test were normal in most of the patients, while there was a decreas in anticoagulant activity of the blood and the following parameters were accelerated: blood coagulation, plasma tolerability to heparin, calcification time, proaccelerin, fibrinogen d fibrinolytic activity. Repeated examination blood coagulation components after surgery vealed a regular acceleration of the blood agulation time, and an increase of fibrinogen dependent of the form of appendicitis (simple catarrhal in 37, phlegmonous in 40 and ngrenous in 20). An increased plasma toler- ility to heparin, thrombotest, and increase in othrombin, proaccelerin and acceleration of calcification time of the plasma were more ten seen in destructive forms of acute appendicitis, especially in aged and senile persons. anges in the coagulogram were dependent on the rm of the inflammatory process, duration of the sease, age, general condition of the patient, mplications and accompanying diseases. The nctional activity of the anticoagulation system s markedly decreased (a decrease of free parin conc. and fibrinolytic activity) in tients with acute appendicitis, especially ring severe involvement of the abdominal cavity. e serum Ca, amount of thrombocytes and duration hemorrhage were unchanged when compared before d after surgery. At 9-14 days after surgery, the majority of patients without complications, e blood coagulation indices, except fibrinogen d fibrinolytic activity, approached the lower mits of normal; fibrinogen remained elevated 57 and fibrinolytic activity decreased in 56. stoperative complications included thrombo- lebitis (1), wound pyosis (3), cardiovascular sufficiency (2) and pneumonia (1). A total of received postoperative prophylactic anti- agulant therapy, and these showed a decrease in e level of prothrombin activity to 35-40% of rmal.

01 THE INNERVATION OF THE MUCOSA OF THE HUMAN ILEOCECAL APPENDIX. (Fr.)

n Campenhout, E. (U. Louvain, Belgium), J. emers and J. M. Jadin. Rev. Canad. Biol. (2):95-107, 1967.

e study was done on 25 appendices; 8 acute, 12 bacute, 3 chronic cases, and 2 cases of per- ration. The temperature of the appendices was duced to 4°C quickly; pieces were fixed in 1% ffered OsO_4; others were fixed in Bouin's soln. ssues were studied by conventional and ultra- croscopy. Some silver impregnations with iline-blue trichromic stains (optical micro- ope) were particularly successful. Networks nerve fibers of the mucosa of the human pendix were precise in distribution and struc- re seen in the optical microscope and con- rmed by electron microscopy. No instance of nervation of the mucous epithelial cells was served in the sections from the 25 appendices. neural terminations of any kind were seen. particular differences in structure of the ural networks in the different appendices were ted. Only in a few cases was there evidence hyperplasia of the neural fibers at the base the glands of Lieberkühn.

9302 SIGMOID MYOTOMY IN DIVERTICULOSIS.

(E.) Dick, E. T. New Zeal. Med. J. 66(415):163-166, 1967.

Of 6 cases presented, 4 were treated for increasing severe constipation. In only 1 (62-yr.-old male with 2-yr. history of constipation) was there X-ray evidence of established diverticulosis. A 49-yr.-old female constipated for 3 yr. showed Ba enema X-ray evidence of prediverticular changes only in the sigmoid intestine with greatly increased irritability. In both of these, sigmoid myotomy was performed and good results were reported at 11 and 10 mo., resp. One case (a 59-yr.-old male with acute diverticulitis and bloody diarrhea) showed diverticulosis and diverticulitis with narrowing of the sigmoid intestine; 8 mo. after operation, the intestinal spasm was relieved but diverticulosis was still present. A 64-yr.-old male with chronic disabling constipation had a normal Ba enema X-ray. Sigmoid thickening was corrected and an unrelated small intestinal obstruction was corrected 1 wk. postoperatively, with good results at 7 mo. A 59-yr.-old female of spastic colon with diarrhea and intestinal colic, operation produced relief of colic, but not of diarrhea. Operation consists of incision along the longitudinal anti-mesenteric taenia and division of the circular muscle fibers down to mucosa so that the mucosa pouts into the longitudinal incision in the intestinal wall. It is suggested that development of diverticulosis probably follows increased intraluminal pressure and that it is reasonable to operate before diverticulosis or its complications become established in cases where intestinal disturbance is marked.

9303 INQUIRY INTO THE RESULTS OF SURGICAL TREATMENT OF CANCER OF THE RECTUM.

(Fr.) Peycelon, R. (Fac. Med., Lyon, France), X. Delore, Y. Jegou and R. Correard. Lyon Chir. 63(3):374-401, 1967.

Results are examined of 372 operations for cancer of the rectum, done by 3 different methods: 164 by perineal amputation (99 men and 65 women; 20-85 yr., av. age 60), 155 by anterior resection (76 male and 79 female; 32-85 yr., av. age 60), and 53 by abdominoperineal amputation (36 men and 17 women; 35-85 yr., av. age 65). Three were high operations, 38 medium, 98 low and 15 in the anal canal; 10 were imprecisely located. Mortality was 7.9%, 7 men and 6 women; causes of death, emboli, shock, and others. Of those operated upon 115 had uneventful recoveries; complications chiefly due to hemorrhage arose during recovery for 15. Long-term results were local regrowth of cancer occurring in 39 patients (in 4 yr.), and the appearance of metastases in 31 (in 4 yr.), 28 in the liver. Other dysfunctions which may have derived from the operation are discussed. After 5 yr., 50 patients survived the operation. Of those who underwent anterior resection, their lesions were situated more than 10 cm above the anocutaneous margin; there were

42 cancers of the high rectum, 57 of the rectosigmoid and 56 of the lower sigmoid. Mortality was very high (20%; 33 patients) but these operations were done in the clinic and death was often due to advanced stages of cancer or to other severe conditions aggravated by operation. Of the 122 who survived the operation, 15 were alive 5 yr. later. Very few local regrowths of cancer or metastases were reported for this group; 17 cancers in the region of the original lesion and only 13 or 14 metastases. Among the 53 cases of abdominoperineal resection, 8 were rectosigmoid; 38, high ampullary (more than 10 cm); 8, medium ampullary (between 6 and 10 cm); 6, low ampullary (between 3 and 6 cm). Mortality in this group was 40.2% (25 patients; 22 men and 3 women). The causes of death were: 5 emboli, 4 blood ammonia, 8 cardiac failure, 1 delerium, 2 infection, 2 occlusion, 2 hemorrhage, and 1 with repeated perforations. Six were alive 5 yr. after the operation with regrowth occurring in 7 instances in the first yr., and 30 in the second yr.; metastases occurred in about 35% of this group. If possible, the conservative perineal amputation should be chosen.

9304 AN EXPERIMENTAL APPROACH TO ADJUVANT CHEMOTHERAPY IN CARCINOMA OF THE RECTUM AND COLON.

(E.) McKinna, J. A. (Metropolitan Hosp., London E. 8). Proc. Roy. Soc. Med. 60(3): 212-214, 1967.

In 36 in vitro perfusions (oxygenated physiological saline-dextran soln. via Dale-Schuster pump) of arterial system of specimens, it was possible to show release of malignant cells into venous perfusate in 27. Factors involved in release were the presence of a fibrinolytic agent in arterial perfusion fluid and manipulation of tumor and intestinal contraction. In in vivo and in vitro observation, certain areas of rectal and colonic carcinomas were not reached by dyes given arterially. X-Rays of the vascular tree showed a hyperemic zone at the tumor edge and a tendency to avascularity in the center. By addition of human RBC to a perfusion fluid of improved electrolyte composition, in vivo perfusion of 2-3 hr. was possible. In 6 patients, thymidine-^{3}H was inj. intra-arterially within 1 hr. of initiation of the experiment. The label was seen in the crypt cells of normal mucosa, in cells of germinal centers of the lymph nodes, and in the tumor cells. Also ^{35}S-half-sulfur mustard (2-hydroxyethyl-2-chloroethyl ^{35}S sulfide) was admin. (1 mc) through a cannula in the inferior mesenteric vein. The drug also contained Patent Blue Violet to indicate macroscopic distribution. Patchy areas of poor staining were seen in luminal and cut surfaces of tumor. The highest conc. of drug was in the local lymph nodes, in a lethal conc. These results suggest the use of alkylating agents, at the time of operation, to inactivate cells which are released into the circulation at subsequent manipulation and to "sterilize" any malignant cells which may have spread to lymph nodes not excided.

9305 LATE DEVELOPMENT OF COLONIC CARCINOMA COMPLICATING URETEROSIGMOIDOSTOMY.

(E Richter, R. M. (Mount Sinai Hosp., New York, N. Y.) and S. A. Ginsberg. Amer. J. Surg. 113(6):843-845, 1967.

Twenty-two yr. after a bilateral ureterosigmoi ostomy for exstrophy of the bladder and ureter hydronephrosis, completed by cystectomy approx. 1 yr. later, a 24-yr.-old women was presented w a deeply infiltrating adenocarcinoma of the col occurring at the site of the left ureterosigmoidostomy, totally obstructing the retrogra flow of the colon, surrounding and completely obstructing the distal orifice of the left ureter and metastasized to regional lymph nodes Following transverse colostomy and left hemicolectomy en bloc (including the distal 4 cm o the left ureter and the left tube and ovary), intestinal continuity was restored by anastomos of the splenic flexure to the sigmoid and a le cutaneous ureterostomy was created. Postoperative failure of the affected kidney to recover function was followed by nephroureterectomy, at which time extensive, retrograde renal metastases were demonstrated, together with metastatic involvement of the ureter in th area adjacent to the anastomotic junction. The patient died 16 mo. later with metastases to th surgical scars, lungs and liver. In view of th site of the primary neoplasm, it is suggested that the adenocarcinoma may have developed as result of some urinary carcinogen or as a resul of constant irritation of the colonic mucosa, due to the presence of urine, resulting in malignant transformation of adenomatous polyps.

9306 TRITIATED THYMIDINE IN A HISTOAUDIORADIOGRAPHIC STUDY OF ADENOMATOUS POLYPS AND ADENOPAPILLOMA OF THE LARGE INTESTINE WITH PARTICULAR EMPHASIS ON THEIR MORPHOGENESIS AND CARCINOMATOUS EVOLUTION.

(It.) Messinetti, S. (U. Rome), G. P. Zelli, L. R. Marcellino and E. Alcini. Ann. Ital. Chir. 43(2):193-215, 19

Rectoscopic studies were made and numerous bio specimens were obtained from 6 adult patients with hemorrhoids and rectosigmoid cancers; an 18-yr.-old boy with recurrent, disseminated, polypoid rectocolitis following total colectom a 34-yr.-old woman with disseminated rectosigm polyposis and 2 villous polyps and an ulcerati rectosigmoidal adenocarcinoma developing from adenoma; a 28-yr.-old patient with a massive, pedunculated, adenomatous polyp at the rectosigmoid junction. Specimens were incubated wi tritiated thymidine (1 μc/ml) in TC Medium 199 at 37°C for periods of 1, 2, 3, 4, 5 and 8 hr., as were numerous biopsy specimens of normal rectal and sigmoidal tissue and numerous specimens of apparently-normal tissue intervening between adenomatous polypoid formations in the patients with disseminated, polypoid rectocolitis. In such intervening, apparently-norma mucosal tissue, anomalous centers of proliferation were demonstrable, consisting of foci of

enerative activity at or near the apex, rather
n the base, of the Galeazzi-Lieberkühn crypts.
s, in turn, did not appear to be due to
lular migration, but to the presence of ectopic
i of proliferation, created by mechanisms
ch could not be defined. The phenomenon was
ught to represent an initial step in the
phogenesis of adenomatous polyps, since a
ked peripheral dislocation of regenerative
liferation, also at or near the apex of the
pt, was demonstrable in these neoformations but
in normal rectosigmoidal mucosal tissue.
dislocation was also evidenced clearly in
lous polyps. Adenomatous polyps, consisting
either differentiated or undifferentiated
ls, tended to develop eccentrically due to
cessive introflexions of the centers of
liferative activity; while villous polyps,
sisting chiefly of undifferentiated cells,
ded to develop along the line of the papillary
s by means of a succession of extraflexions
these centers of proliferative activity, a
nomenon thought to account for their increased
ential malignancy.

7 A COMPARATIVE ELECTRON MICROSCOPIC STUDY
OF HUMAN AND RAT COLONIC POLYPS AND
CINOMAS. (E.) Spjut, H. J. (Baylor U. Coll.
., Houston, Texas) and M. N. Smith. Exp.
ec. Path. 6(1):11-24, 1967.

onic polyps and carcinomas of white Wistar
s, both sexes, induced by daily s.c. inj. of
'-dimethyl-4-aminodiphenyl (2 mg/100 g), were
died under the electron microscope and com-
ed to similar human lesions. Both showed
nificant alterations of microvilli, desmosomes
nuclei when compared to the normal; however,
ered goblet cells were observed in rat lesions,
not in human neoplasms. Large, dense,
lular inclusions were noted in the rat cecal
osa and polyp, as well as in human polyps and
cinomas. Small, dense, loose groups of intra-
lear bodies were seen in 2 human carcinomas,
their nature was not evident. These electron
roscopic findings represent another area of
ilitude between an experimental model for the
dy of large intestinal neoplasms and the human.

3 STUDIES ON NORMAL AND CECECTOMIZED RATS.
(Ger.) Kunz, E. (U. Basel, Switzerland).
Ernaehrungswiss. 8(1-3):1-27, 1967.

investigate the function of the cecum in
estion, and the effect of the cecum upon
rophagy, cecectomy was performed on young
s (30-40 g). The cecum was ligated and ex-
ed leaving only the ligated stump which was
ured by 3 Lembert cross-ties. Histological
mination of the cecal stump, from animals up
2 yr. after operation, showed no tendency of
thelial overgrowth and no inflammation in
um or large intestine; the serosa remained in
ellent condition. An aftereffect was the
ardation of body growth which was less
strongly expressed in sham-operated animals. The operated rats were fully viable and with normal feeding never showed any digestive disorders in 2 yr. of observation. Paired animals, 1 operated and 1 normal, in a special battery of cages, were studied for metabolic processes; daily determinations of water, food consumption, urinary and fecal output, and measurement of body wt. were carried out. Coprophagy was controlled. These methods allowed the testing of different diets such as, a normal formulated complete nutrition, a protein-poor diet, or a single type of food as barley, or rolled oats, on cecectomized and normal rats. Cecectomized rats had a travel time through the alimentary tract of 4.5-7.5 hr. (normal diet). The normal rat had a greater variation of 4.5-36 hr. due to possible cecal storage. In normal animals about 35% of the food did not pass through the cecum (filled) and moved from ileum into the large intestine. Food material may remain in the cecum up to 30 hr.; the most frequent time intervals were 2-10 hr. (26%) and 18-30 hr. (29%). The cecum never emptied completely. Cecectomized rats were coprophagic resulting in better food utilization and an increased food intake. Cecectomy without coprophagy caused an inefficient utilization of food. If fed a complete diet, rats deprived of their cecum show growth depression due to lower food utilization. Protein deficiency or a uniform diet cause a diminished utilization which is compensated by more food intake. The net result is a growth rate comparable to a normal rat growth rate. Graphs show that the growth rate of normal animals is depressed on a protein-deficient or a uniform diet to conform to that of the cecectomized animals on the same diet.

9309 DYNAMICS OF THE FUNCTIONAL CHANGES OF THE STOMACH AND DUODENUM IN COLITIS PATIENTS UNDER COMPLEX TREATMENT. (Rus.) Mirzaev, T. M. (Uzbek Med. Inst., Tashkent, USSR), N. R. Rakhimov, A. I. Il'khamov, N. D. Dekhkankhodzhaeva and T. N. Ubaidullaev. Med. Zh. Uzbek. (4):14-16, 1967.

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9311 DIET IN COLITIS. (Fr.) Lederer, J. (Catholic U., Louvain, Belgium). Louvain Med. 86(6):369-372, 1967.

9312 TREATMENT OF SPASTIC AND PSYCHOSOMATIC DISEASES OF THE COLON BY A CICATRIZANT, ANTISEPTIC AND TRANQUILLIZING DRUG. (Fr.) Navarranne, P. Therapie 22(2):419-426, 1967.

9313 TOPICAL TREATMENT WITH FLUMETHASONE PIVALATE ON SECONDARY PERIANAL DERMATITIS

FOLLOWING SURGICAL DISEASES OF THE ANUS OR COMPLICATIONS OF SURGICAL ANI PRETER. (It.) Giacomini, F. (Viarana Hosp., Milan, Italy) and B. Rizzi. Minerva Chir. 22(10):625-632, 1967.

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9315 UNPLANNED RESECTION OF THE LARGE INTESTINE. (Cz.) Michněvič, I. (Charles U., Prague). Rozhl. Chir. 46(6): 418-423, 1967.

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9320 ELECTROMYOGRAPHY IN ANORECTAL DISEASES. (E.) Becerra, E. J., E. Corral, J. S. Alonso and G. L. Guzmán. Dis. Colon Rectum 10(4):282-287, 1967.

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9326 IMPROVED HYDRAULIC REDUCTION OF INFANT COLONIC INTUSSUSCEPTION IS POSSIBLE. (E.) Noveroske, R. J. (Gibson Gen. Hosp., Princeton, Indiana). Amer. J. Proctol. 18(4): 316-319, 1967.

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See also abstract nos.: 8803,8805,8806,8807,8902,9141

THE ANTI-COLON ANTIBODIES DURING HEMORRHAGIC RECTOCOLITIS. (Fr.)
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rch for antibodies against the human colon
nvestigated using immune fluorescent technic
cases of ulcerative colitis and 250 controls.
were obtained from the 44 patients and from
50 controls as were biopsy specimens of
ic and rectal mucosa; the activity of some
upon biopsies of the fundus and ileum was
studied. Fluorescent immune sera (anti-
γ-globulin fluorescent γ-globulins) were
oped in the rabbit and prepared by Goldstein's
ic. The frozen sections were examined by
ndirect immunofluorescent method. The
tivity of the method was checked against
e sera developed in the goat. The specificity
e reaction was confirmed by Coons' test.
odies could be demonstrated in colon samples
patients, but the serum of only 1 patient
ed with all the samples of human colon
ed. The apparent discrepancies in the
ature of the subject are probably due to
ariability of the antigenic composition of
uman colon. Colonic material of dog, rat,
onkey reacted only with the anti-A agglutinins
e sera of the 44 patients and the 250 con-
, i.e., in the sera of 13 patients and 81
ols.

TOXIC MEGACOLON. SIGNIFICANT IMPROVEMENT IN SURGICAL MANAGEMENT. (E.)
ec, N. A. (Mayo Clin., Rochester, Minn.),
Judd and W. G. Sauer. Arch. Surg. (Chicago)
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al of 37 patients with toxic megacolon are
ted; they were divided into 2 groups, medical
atients) and surgical (23 patients), depend-
pon the ultimate form of treatment given.
ccurrence of toxic megacolon often appeared
related to diagnostic investigative proce-
and therapeutic regimens; 57% of the medical
and 35% of the surgical group had Ba enemas
. of 8.6 days (range 1-23) before onset of
megacolon; in 43% of the 37 patients, toxic
ation developed within 9 days of Ba enema
. One patient in the medical group and 4
in the surgical group developed toxic
olon 2-6 days after admin. of codeine.
al treatment consisted of admin. of antibi-
and chemotherapeutic agents to all patients,
ll as vigorous replacement therapy. Improve-
occurred in the 14 medically treated patients,
e av., within 7 days; duration of hospitaliza-
av. 31.2 days (range 11-60). One medically-
ed patient died, but death was not related
tly to toxic dilatation of the colon. The
rgically-treated patients were hospitalized
. of 19 days before surgery; the av. for
ntire hospitalization was 50.5 days. Nine of the 23 had perforations of the colon, and in 5 they were multiple; in 3 of the 9, perforations were diagnosed preoperatively. Indications for operation were 1) persistent dilatation, bloody diarrhea and failure to improve in 12 patients; 2) persistent dilatation and failure to improve in 7; 3) colonic perforation in 3; and 4) obtunded state on admission with no improvement on medical treatment in 1. The surgical procedures and number of cases were as follows: total proctocolectomy, 3; subtotal colectomy and ileostomy with mucous fistula or Hartmann procedure, 10; subtotal colectomy and ileostomy with subsequent abdominoperineal resection, 7; subtotal colectomy and ileorectosigmoidostomy, 1; and ileostomy and ileomucous fistula, 2. Eighteen complications occurred in 13 patients; wound infection was found in 6, wound dehiscence in 1 who was on steroid therapy, and 1 each of the following occurred: abscess at the ileostomy site, staphylococcal enteritis, persistent ileus, fecal abscess secondary to perforation of splenic flexure, jaundice (which cleared spontaneously), pulmonary embolism, and right pleural effusion (which cleared spontaneously). Three surgical patients died. One death was due to an abscess about the rectal stump and associated peritonitis, 1 was due to empyema of the right pleural space, bacterial endocarditis and peritonitis and the third to peritonitis. The mortality was 13% for the surgical patients, and 11% for the entire series.

9366 PROCTITIS (RECTO-SIGMOIDITIS, INFREQUENT RECTOCOLITIS HEMORRHAGICAL) IN THE AMBULANT GASTROENTEROLOGIC PRACTICE OF A LARGE CITY. THIRTY-SEVEN CASES AMONG 10,000 NEW PATIENTS. (Ger.) Kaufmann, W. (Wallrafplatz 1, Cologne, Germany). Gastroenterologia (Basel) 107(3):161-163, 1967.

Hemorrhagic rectocolitis is essentially ulcerous, usually acute or subacute, and fairly difficult to treat. The incidence is greatest in the rectum and sigmoid so that the proctoscope is the chief diagnostic tool up to the upper end of the sigmoid loop. Of 10,000 cases, 37 (13 men and 24 women) had this condition or its variants, while 60 patients, mostly elderly, were discovered with cancer of the rectum or sigmoid. Most of those with rectocolitis were 30-50 yr. old; 1 man and 4 women were less than 30 yr. old. Among the young there was a tendency toward urticaria, eczema and psychoneurotic manifestations. Sometimes a change of environment proved beneficial, therefore, the usual therapy with high doses of salazosulphapyridine (Azulfidine), phanquinon (Mexaform) and prednisone did not seem warranted. Two of the 37 patients did poorly; 1 developed swelling of the descending colon with narrowing of the lumen, and was sent to surgery (the only 1 of the 37); 3 days after colectomy the patient was dead of pulmonary emboli. The other case, (a 32-yr.-old man) after

6 wk. treatment with improvement, received intensive treatment for 3 mo. with daily 6 tablets of salazosulphapyridine as well as 6 phanquinon in addition to 19-nortestosterone 17-phenylpropionate (Durabolin), streptomycin 25 mg prednisone, and desoxycortone (Decortin), together with a special diet. After 3 mo. the patient had lost 11 kg more and had developed a bleeding peptic ulcer. He was transferred to surgery and 3 wk. later underwent rectocolonic amputation. A few days later a massive hemorrhage occurred from the peptic ulcer and the patient died. Lighter medication and a milder diet are recommended.

9367 PATHOGENESIS AND THERAPY OF ULCERATIVE COLITIS. (Ger.)(Rev.) Kühn, H. A. (Justus Leibig U., Giessen, Germany). Therapiewoche 17(30):1014-1020, 1967.

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Dis. Clin., Cracow, Poland) and A. Kieta-Fyda
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9371 ENTEROKINASE AND ALKALINE PHOSPHATA
IN DUODENAL AND INTESTINAL CONTENTS
IN PATIENTS WITH NONSPECIFIC ULCERATIVE COLIT
(Rus.) Il'khamov, A. I. (Uzbek Med. Inst.,
Tashkent, USSR), T. D. Guliamov and B. F. Kad
Med. Zh. Uzbek. (4):9-11, 1967.

9372 GRANULOMATOUS COLITIS OF BOXER DOGS
COMPARATIVE ASPECTS. (E.)(Rev.)
Van Kruiningen, H. J. (New York State Vet.
Coll., Ithaca). Gastroenterology 53(1):114-1
1967.

FUNCTIONAL CLINICAL DIAGNOSTIC TESTS
FOR CARCINOMA OF THE PANCREAS. (WITH
AL REFERENCE TO THE PANCREOZYMIN-SECRETIN
AND PROTEOLYTIC ACTIVITY OF THE STOOL.)
) Filippini, L. (U. Zurich, Switzerland) and
mann. Schweiz. Med. Wschr. 97(25):803-810,

hymotrypsin and trypsin activity of the stool
letermined in 21 patients with malignant, but
ndocrinically active, pancreatic tumors (19
of cancer of the head and 2 cases of the body
e tail of the pancreas). In addition, the
eozymin-secretin test could be carried out
cases. Trypsin and chymotrypsin activities
done with synthetic specific substrates.
nal juice was analyzed for chymotrypsin,
in and also amylase after admin. of pancreo-
and/or secretin. The most reliable parameter
ncer of the head of the pancreas proved to be
ntraduodenal enzyme output following pancreo-
: The values for diastase (U), trypsin (γ),
hymotrypsin (γ), (20 min. secretion) were,
, 4105, 1374, 791, (normal values, in the
order, 32,200, 13,200, 10,500). This was the
or 16 patients, but 3 others with cancer of
ead of the pancreas as well as 2 with
r of the body or tail had values approx. 3
normal for the same time interval. Sixteen
patients showed depressed fecal chymotrypsin
s, the fecal trypsin values were less reliable.
suggested that fecal chymotrypsin be used as
eening test inasmuch as it correlated well
the pancreozymin-induced secretion of
trypsin in the duodenum.

SYSTOLIC MURMUR OF THE SPLENIC ARTERY,
A SIGN OF CANCER IN THE BODY OF THE
EAS. (Fr.) Warter, J. (Fac. Med., Strasbourg,
e), J. Schwarts, A. Sacrez and B. Gillet.
bourg Med. 18(3):281-287, 1967.

cases a systolic murmur was heard by auscul-
n of the left subumbilical region and the
hypochondrium due to compression of 1 or more
ies near the pancreas and, principally, com-
ion of the pancreatic artery itself. Ab-
al arterial phanangiograph showed a type of
r caused by narrowing of the arterial lumen.
esults of an aortograph or selective arteriog-
of the celiac trunk should logically prove
contentions; locating the condition precisely
isclosing the mechanism. The fifth case, a
.-old woman with abdominal pain had recently
gone a severe change in her general condi-
she had hypertension not noted in her 2-yr.-
ecords; she complained of epigastric pain
ting to the left hypochondrium and resistant
l treatment, beginning 14 mo. before; begin-
12 mo. before she lost wt. rapidly, accom-
d by some vomiting. Abdominal examination
ot reveal a tumor; the remainder of the
examination revealed an arterial blood pressure of 200/110 and a left hemiparesis with a left Babinski sign. Bilirubin was high, 21 mg%; WBC count was high (11,000/mm^3); RBC was low, 3,400,000/cu mm; hemoglobin was low, 62%. All other tests were normal including gastroduodenal transit. Urography i.v. was negative. Auscultation of the left epigastrium and hypochondrium revealed a typical systolic murmur. Selective arteriography of the celiac trunk indicated that part of the arterial narrowing was splenic and hepatic with stenosis of the median branch of the splenic artery. Diagnosis of cancer of the body of the pancreas was confirmed at surgery, but hepatic and peritoneal metastases rendered pancreatectomy impossible. The arterial murmur was recorded together with the electrocardiogram and the arterial pulse; the murmur possessed a very large high frequency component.

9375 RENAL DAMAGE IN ACUTE DISEASES OF THE PANCREAS. (Ger.) Dabels, J. (U. Clin. Rostock, Germany), K. Diwok and M. Gülzow. Deutsch. Z. Verdau. Stoffwechselkr. 26(5-6):229-241, 1966.

Among 267 patients, 101 with necrosis of the pancreas and 166 with moderately severe pancreatitis, 72 died (only 3 with pancreatitis). From clinical evidence (uremia) and from autopsy it was clear that 16 of these patients succumbed to renal failure. Of the 69 with pancreatic necrosis, 38 had some degree of renal damage visible at autopsy. The symptomatology of kidney damage following pancreatic disease was striking: in 236 patients with pancreatic necrosis and pancreatitis 50.8% or 120 had proteinuria and 29.2% or 69 had erythrocyturia early in the pancreatic disorder. Those with pancreatic necrosis had a higher percentage of pathological urinary findings than those with moderately severe pancreatitis. Nonprotein nitrogen excretion was increased 53% in 74 with necrosis and 25% in 86 with pancreatitis. The xanthoprotein reaction fell in 23% of those with necrosis and in 17% of the cases of pancreatitis. In most of the patients the endogenous creatinine clearance was decreased in the acute stage of pancreatitis and the plasma levels of creatinine increased. The severity of the renal disturbances ran parallel to the pancreatic malfunctions. Electrolyte imbalances, especially of Ca, and water loss resulting in oliguria, appeared toward the end; renal blood flow decreased. Water loss occurred through earlier excessive urination, vomiting, accumulation of fluid in the peritoneal cavity. Proteinuria caused a drop in the oncotic pressure of blood plasma with loss of water into tissue spaces. Possible etiologic factors were 1) Shock causing renal ischemia, 2) toxic activity of breakdown products of protein, 3) damage caused by proteolytic enzymes of the pancreas, 4) intravascular coagulation.

9376 PANCREATIC ISCHEMIA TOLERANCE. (Ger.) Moser, R. (Surg. U. Clin. A, Zurich), H. U. Meili and F. Largiadèr. *Z. Ges. Exp. Med.* 143(3-4):266-276, 1967.

A group of 28 dogs (18-27 kg) were laparotomized under anesthesia with artificial respiration, the gastro- and pancreaticoduodenal arteries, and the pancreatic branches of the linealis artery were laid bare and looped with ligature thread; small blood vessels in the mesoduodenum and the posterior fold of the greater omentum were electrically coagulated. Finally, the animals were heparinized and the arteries named clamped off with bulldog clamps. To hinder any blood flow to the pancreas over duodenal pathways the pylorus and the lower third of the duodenum were lightly clamped off. The completeness of the pancreatic ischemia was tested by the i.v. inj. of the vital dye Citon Fast Green in 10% soln. The duration of the ischemia was from 1-6 hr.; the abdomen was temporarily closed by clips. The pancreata with 6 hr. ischemia were cooled to 7°C, with a thermostatically-controlled cooling system operating through a balloon. In some cases the electrocardiogram and the blood pressure were registered; blood vol. was measured by ^{131}I-radioactivity. Pancreatic tissues obtained from these animals were prepared for optical and electron microscopy. Ischemia of the pancreas up to 4 hr. was tolerated with month-long or greater survival. Ischemia of 5-6 hr. resulted in a survival time of only 1 day in 8 of 15 dogs. The others survived from 4 days to more than 2 mo. (2 dogs). A rise in serum amylase was often observed but there was no apparent correlation with the duration of ischemia. Electron microscopy showed pronounced intracellular damage even with ischemia of only 2 hr. This consisted of chromatin clumping in the nuclei with marked folding and wrinkling of the nuclear membrane, swelling of mitochondria and a translucence of zymogen granules. The matrix space became lighter. The protein secretion of the exocrine cells was conc. in the canals of the Golgi apparatus in the apical region of the cells as thick zymogen granules. After the ischemia these large zymogen granules disappeared. No differences were visible in the conventional histologic preparations of the surviving animals at the end of ischemia. Histological evidence of damage was always present in autopsy material.

9377 MODIFIED TECHNIC FOR THE ISOTOPIC TRANSPLANTATION OF THE PANCREAS. (Ger.) Largiadèr, F. (Surg. U. Clin. A, Zurich). *Z. Ges. Exp. Med.* 143(3-4):261-266, 1967.

Dogs served as donors (16.5-39 kg) and as hosts (19.5-33 kg). Fundamentals of the surgical technic included: 1) In the donor the entire pancreas and duodenum were removed together with the celiac trunk and its branches and the portal vein with its tributaries. A duodenopancreatectomy with an end-to-end cholecystoduodenostomy was performed in the host. The celiac trunk of the transplant with a cuff formed of the donor aortic wall was implanted in the subrenal abdominal
aorta, and the portal vein in the suprarenal
cava of the host; the proximal duodenum of th
transplant was joined end-to-end with the sto
and the distal duodenum with the small intest
of the host end-to-side. Variations in the s
gical technics were confined to different ana
tomoses of the blood vessels. To allow for a
physiologic passage of pancreatic venous bloo
through the liver, the portal vein of the tra
plant was implanted into the distal portal ve
of the host instead of into the inferior vena
cava. Some complications encountered in earl
trials can be avoided: 1) Implanting the stu
of the common bile duct in the duodenum inste
of ligating it prevented necrosis of the stum
and insufficiency. 2) Ascending cholangitis
prevented by implanting the graft at a lower
i.e., in the second loop of the jejunum. 3)
ulcerative duodenitis seen in animals survivi
for longer periods was reduced by gastric res
tion in the host. If the inferior pancreatic
duodenal artery was retained on the transplan
amputation of the unicate process of the panc
was unnecessary. This was based upon the experience gained in 51 transplantations with s
vival times of the recipient up 49 days.

9378 SALIVARY STUDIES IN CYSTIC FIBROSIS
(E.) Mandel, I. D. (Columbia U. Sc
Den. & Oral Surg., New York City), A. Kutsche
C. R. Denning, R. H. Thompson, Jr. and E. V.
Zegarelli. *Amer. J. Dis. Child.* 113(4):431-4
1967.

Parotid and submaxillary saliva were obtained
from 62 subjects (28 male, 34 female; 6-19 yr
old; 75% were 9-13 yr. old) with cystic fibro
and a group of apparently healthy individuals
similar in age and sex who served as controls
Amylase, lysozyme, urea and uric acid were assayed in parotid saliva; 2 amylase methods we
used: the Caraway modification of the standa
Smith-Roe starch-iodine (amyloclastic activit
and 2) the Berenfeld dinitrosalicylic acid-reducing sugar method (saccharogenic activity).
Although mean and median values of amylase we
higher in cystic fibrosis patients, there wer
significant differences between the groups wi
either of the 2 procedures. The mean and
median values for lysozyme activity were lowe
for the cystic fibrosis group, but difference
were not significant. Ammonia levels and flo
rate were almost identical in the 2 groups, b
urea nitrogen and uric acid were significantl
higher in the cystic fibrosis group. In the
study of submaxillary saliva, the cystic fibr
group had statistically significant elevation
Na, Cl, Ca, P, urea and uric acid; K values w
not significantly higher, and flow rate was l
in the cystic fibrosis group. Values for tot
protein, fucose and hexose were significantly
higher in cystic fibrosis patients. With the
dinitrosalicylic acid procedure, cystic fibro
patients exhibited a significantly higher amy
activity than controls; the elevation was not

ounced with the starch-iodine method. Lysozyme
ity was significantly higher in the cystic
sis group. Polyacrylamide gel disc electro-
esis was used as a means of comparing the
rn of submaxillary protein fractions from
nts with mucoviscidosis with a control group
ildren; when equal vol. of submaxillary saliva
compared, the cystic fibrosis group exhibited
intense staining and a greater number of pro-
discs than controls; when the vol. were ad-
d so that equal amounts of protein were com-
, the major difference between the 2 groups
somewhat greater intensity of staining in
'amylase-glycoprotein region" in the gels with
c fibrosis samples. The other areas were
comparable in number and intensity of discs.
ntrast to rather limited alteration in over-
omposition observed in the parotid secretion,
xillary saliva was markedly altered in cystic
sis patients. Based on comparison of mean
s with healthy controls, cystic fibrosis pa-
s had significant elevations in 1) electrolytes
, Cl, Ca and P; 2) the organic nonelectrolytes,
and uric acid; and 3) total protein, amylase,
yme and protein-bound hexose and fucose.
stically, the most significant elevations in
c fibrosis patients were in conc. of Ca and P.

THE PHYSIOPATHOLOGY OF THE EXOCRINE
FUNCTION OF THE PANCREAS BEFORE AND
BILLROTH II. (Ger.) Wagner, E. (U. Giessen,
ny). Deutsch. Med. Wschr. 92(22):1016-1022,

xocrine function of the pancreas was measured
tients before and after gastric resection
onstruction of Billroth II and compared to
ancreatic function of normal healthy in-
uals. The standard methods of Rick were used
specific stimulation of the gland by means
cretin and pancreozymin. The duodenal and
ic secretions were separately collected by
ble-balloon 3-way catheter in the preoperative
ormal subjects. For the collection of duo-
fluid from the afferent loop of Billroth II,
ble-balloon 2-way catheter especially de-
d for the purpose was used; this was also
for the recovery of secretion from the gas-
stump. The dose of secretin and pancreozymin
clinical U/kg body wt. i.v. The vol. of
tion, bicarbonate conc. and the rate of
tion of trypsin, chymotrypsin, carboxypep-
e A, amylase and lipase were determined.
a betazole inj. the acidity of the gastric
, collected over a period of 2 hr., was
ted. A total of 107 pancreas function tests
completed. Test runs on 20 ulcer patients and
rmal subjects showed that these 2 groups had
the same rate of enzyme secretion in the
nal fluid. Nine of the 20, however, had a
ased bicarbonate conc. Vol. of secretion
he same; 4 mo. after a Billroth II in 10 of
ses there was evidence of secretory dis-
nce of the pancreas best described as a
tory stasis. At least 4 yr. after operation
59 patients investigated showed either some
degree of dissociation of enzyme secretion or a total loss of secretion; 16 patients had subnormal secretion vol. and 26 had bicarbonate conc. below normal. The action of secretin and pancreozymin reveals the limitation of pancreatic secretion some time after the operation resulting from increased atrophy and, finally, fibrosis of the gland. Fibrotic transformation of the gland has been observed, increasing with time following a Billroth II. The afferent loop should be as short as possible.

9380 STIMULATION OF INSULIN SECRETION BY SECRETIN IN MAN. (Ger.) Bottermann, P. (U. Munich, Germany), K. Schwarz, M. M. Forell, H. Stahlheber and A. Souvatzoglou. Klin. Wschr. 45(1):52-53, 1967.

After a number of preliminary trials, it was discovered that the simultaneous i.v. inj. of glucose (0.5 g/kg body wt. as a 50% soln.) and secretin (1.5 U/kg body wt.) raised the blood insulin level significantly above the increase caused by the admin. of glucose alone. Thus the av. increase of serum insulin was 140 μU/ml in 6 subjects (from 40 to 180 μU/ml) in 10 min. inj. with glucose only; for the same 6 subjects under the same experimental conditions inj. simultaneously with glucose and secretin, the av. rise in serum insulin was 263 μU/ml (from 40 to 303 μU/ml) in 10 min. The peak insulin conc. in both groups of tests came at 10 min. after inj. The decline in serum insulin was less rapid when glucose only was inj.: After 1 hr. the serum insulin level was 130 μU/ml. One hr. after inj. of both glucose and secretin the serum insulin level was 100 μU/ml. The fall in each case was nearly linear. The admin. of secretin alone was without any effect upon the serum level of insulin. The β-cytotropic effect occurs in man.

9381 CHRONIC DIARRHEAS IN INFANCY AND CHILDHOOD. II: ENZYME CONTENT OF DUODENAL JUICE. (E.) Ingomar, C. J. (Dronning Louise Child. Hosp., Copenhagen) and E. Terslev. Arch. Dis. Child. 42(223):289-293, 1967.

The study was done on 112 children up to the age of 6; 42 were normal controls; 70 had diarrhea and were suspected of malabsorption or maldigestion. Excluded were cases of diarrhea due to dietary errors, cases of intestinal infection or cases due to parenteral infections; the conditions had been of relatively long-standing. Activities of amylase, lipase, and trypsin of the duodenal fluid were collected by aspiration, unmixed with gastric juice, for 1 hr. after stimulation by powdered buttermilk (Eledon); the position of the duodenal tube was checked radiologically; during its collection the duodenal fluid was cooled on ice and immediately after collection it was frozen at -16°C. The following tests were also applied to each patient: 1) determination of fecal fat on a diet with a known fat content, 2) D-xylose tolerance test, 3) determination of

Na and K in perspiration. On the basis of these 3 tests the 70 patients were divided into 4 groups: Group 1 (8 cases) sweat test abnormal, Na excretion greater than 6 mEq/liter and Na:K ratio greater than 2:5. Group 2 (22 cases) sweat test normal but D-xylose tolerance test abnormal, max. xylose conc. in blood less than 26 mg/100 ml after admin. of 15 g D-xylose/m^2 body surface area, and excretion in 24-hr. urine less than 16% of admin. quantity. Group 3 (16 cases) sweat tests and D-xylose tolerance normal but fecal fat equal to or greater than 10%. Group 4 (24 cases), all 3 tests normal. The amylase activity in the fasting duodenal juice from infants under 6 mo. of age was low; lipase activity was lower in infants and children under 2 yr. than in children over 2 yr. A consistently low enzyme activity (amylase, lipase and trypsin) was found only in patients with mucoviscodosis, i.e., Group 1. Group 4 children with normal sweat, fat excretion, and D-xylose tolerance tests had enzyme values no lower than the control group. Infants and children, Group 2, with normal sweat tests but abnormally low D-xylose tolerance tests did not show any reduction in pancreatic enzyme activity. Group 3 individuals with normal sweat tests and normal D-xylose tolerances but increased fecal fat showed moderately low values for some enzymes, suggesting pancreatic insufficiency.

9382 TRAUMATIC PANCREATITIS. (E.) Marx, F. W., Jr. (10921 Wilshire Blvd., Los Angeles, Calif.). Pacif. Med. Surg. 75(4):235-239, 1967.

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9388 COMPARATIVE RESULTS OF HYPOTONIC DUODENOGRAPHY AND OTHER TECHNICS OF RADIOLOGIC EXPLORATION OF THE PANCREAS. (Fr. Mallet-Guy, P. and P. Jacquemet. J. Radiol. Electr. 48(6-7):352-361, 1967.

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9392 PANCREATIC SCINTIGRAPHY. (It.) Lacroix, L. (U. Turin, Italy), S. Chiarle, R. Cattaneo Godio and G. Curino. Minerva Med. 58(47):2208-2212, 1967.

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9394 RADIOLOGIC DATA ON ANNULAR PANCREAS (Fr.) DuBois, R. and P. Debeugny. J. Radiol. Electr. 48(6-7):369-372, 1967.

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399 CHLORIDE SECRETION BY A SINGLE SUDORIFIC GLAND IN MUCOVISCIDOSIS. (Cz.) Toman, . (Second Pediat. Clin., Brno, Czechoslovakia), . Rovenský, J. Procházková and J. Borská. Cesk. ediat. 22(6):527-532, 1967.

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401 PLASMA GROWTH HORMONE LEVELS IN CHILDREN WITH CYSTIC FIBROSIS AND HORT STATURE. UNRESPONSIVENESS TO HYPOGLYCEMIA. E.) Green, O. C. (Northwestern U. Med. Sch., hicago, Ill.), R. Fefferman and S. Nair. J. lin. Endocr. 27(7):1059-1061, 1967.

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9403 NASAL MUCOSA IN PANCREATIC CYSTIC FIBROSIS. (E.) Magid, S. L. (U. Utah Med. Sch., Salt Lake City), C. C. Smith and D. A. Dolwitz. Arch. Otolaryng. (Chicago) 86(2): 212-216, 1967.

9404 THE WISKOTT-ALDRICH SYNDROME ASSOCIATED WITH MUCOVISCIDOSIS IN THE SAME PATIENT. (E.) Bitar, J. (American U. Hosp., Beirut) and R. Lightwood. J. Pediat. 71(1):123-126, 1967.

9405 CARCINOMA OF THE PANCREAS IN UNIVERSITY COLLEGE HOSPITAL, IBADAN, NIGERIA. ANALYSIS OF 47 PATIENTS. (E.) Solanke, T. F. (Univ. Coll. Hosp., Ibadan). W. Afr. Med. J. 16(3):92-95, 1967.

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9407 FEEDING BY JEJUNOSTOMY IN THE TREATMENT OF ACUTE SEVERE PANCREATITIS. (Fr.) Kiekens, R. (Brugmann Hosp., Brussels), P. Kinnaert and J. P. Govaerts. Acta Chir. Belg. 66(1):45-57, 1967.

Two cases are reported in detail of the feeding by jejunostomy following the acute phase of necrotic hemorrhagic pancreatitis; these patients were affected by a prolonged gastric inability to tolerate feeding. Feeding by jejunostomy prevented profound nutritional defiency in spite of long and difficult postoperative courses. Both patients were admitted with violent epigastric pain, elevated serum and urinary amylase, high WBC counts; 1 had a serum Ca level of only 6 mg%. Both underwent partial pancreatectomy and the construction of a jejunostomy about 20 cm below the angle of Treitz. Upon return of peristalsis water was introduced through the jejunostomy, then progressively larger amounts of nutritional fluids. In 1 case feeding was exclusively by jejunostomy for 1 mo., then gradually over a period of 3 wk. and feeding was reinstituted; the jejunostomy tube was removed 2 mo. after the operation. In the other case, feeding through jejunostomy was continued for 3 wk. At the end of the first wk. of jejunostomy feeding the patient tolerated 2 liters of homogenized foodstuffs and sugar water. The homogenized foodstuffs contained casein, dried milk, potatoes and legumes with a supplement of NaCl; this preparation had 1000 calories/liters. At first, the digestion and absorption of foodstuffs was inadequate, especially fat which was kept low in the homogenate. Gradually over the period of observation the enzyme conc. of trypsin, amylase and lipase rose to about half the normal values. The patients had received blood and blood plasma during and after surgery in the usual amounts. One patient maintained his wt.; the other lost 3.5 kg. Feeding by jejunostomy in this type of case seems to have definite advantages.

9408 CHOLEDOCHODUODENOSTOMY IN TREATMENT OF CHRONIC PANCREATITIS AND CHOLEDOCHOLITHIASIS. (E.) Burgess, J. N. (Mayo Clin., Rochester, Minn.) and H. A. Kidd. Brit. Med. J. 2(5552):607-609, 1967.

Over a 10-yr. period 31 patients were treated by choledochoduodenostomy for chronic pancreatitis and/or choledocholithiasis; 27 were followed-up by personal interview; 3 others, over 85 yr. of age, were seen by their own physicians. All were asked if the results of the operation were satisfactory, if they had since suffered abdominal pain or indigestion, become jaundiced, lost wt., or had experienced diarrhea; they were asked about bowel movement and appetite and if they had experienced pain on taking fizzy drinks. At the time of operation ages varied from 34-86 yr. with an av. of 62 yr. The follow-up occurred from 1 mo.-10 yr. after surgery and av. 4 yr. A the operation a thorough exploration was made of the biliary tract and the pancreas. Cholecystectomy was performed, if necessary, and a side-to-side anastomosis made between the bile duct and the duodenum. No operative deaths occurred. Of 22 undergoing this operation for chronic pancreatitis, the results were good in 20 patients (91%); 10 patients had no symptoms whatsoever; 5 had occasional slight epigastric discomfort after meals; 2 had occasional mild heartburn; 3 felt brief right hypochondrial pain after drinking fizzy water only, possibly due to passage of gas into the bile duct. Two cases showed poor results; 1 a 66-yr.-old diabetic female suffered from lower abdominal colic with diarrhea and jaundice; the other, a 34-yr.-old woman suffered repeated attacks of epigastric pain radiating through to the back. Nine patients with choledocholithiasis were operated upon. Four had previous cholecystectomy and exploration of the common bile duct; the other 5 had multiple stones in the common duct; 2 patients died of congestive heart failure 9 and 20 mo. after surgery; 8 of the 9 patients had good results; a 71-yr.-old woman suffered abdominal pain relieved by simple laparotomy; no abnormality was found. Choledochoduodenostomy by side-to-side anastomosis is the treatment of choice for chronic relapsing pancreatitis and choledocholithiasis.

9409 MARGINAL NEUROTOMY IN SOME FORMS OF CHRONIC PANCREATITIS. (Rus.) Trunin, M. A. (Leningrad Sanit.-Hyg. Med. Inst., USSR) and I. F. Krutikova. Vestn. Khir. Grekov. 98(1): 47-53, 1967.

A new surgical procedure on the autonomic nervous system in severely painful chronic pancreatitis is presented, based on the results of studies of the innervation of the pancreas (on 45 human adult cadavers and 25 animals, probably dogs), data from the literature, experimental material and clinical observations. Marginal neurotomy consists of max. complete resection of autonomic nerves approaching the pancreas on its perimeter. The procedure is as follows: Lateral or upper central resection of the abdominal cavity is followed by opening of the bursa omentalis through the gastrocolic ligament and revision of the ligament and pancreas; parietal peritoneum was opened along the upper end of the pancreas, novocain was admin. under the semilunar ganglions of the solar ganglion located to the right and left from the celiac stem, and nerves approaching the pancreas from right and left were resected; additionally, peritoneum above the mesenteric vessels was incised and the pancreas was mobilized with resection of the approaching nerves. It is desirable to incise the lower pancreatic-duodenal artery in order to destroy its autonomic plexus bringing nerves to the pancreatic head.

necking of hemostasis, drainage of the bursa nentalis and suture of the wound in layers ollowed. The advantages of this suggested rocedure include decreased trauma, disturbance nly of the innervation of the pancreas, a reuced incidence of postsurgical complications, nd achievement of good results not only in the ase of an isolated involvement of the head but so in total involvement of the pancreas. arginal neurectomy was performed on 18 patients men, 15 women; 26-61 yr. old) with severely ainful chronic pancreatitis. Preliminary reults (with a follow-up of more than 10 mo.) are ncouraging. Two case histories are given in etail.

410 INTERRELATION BETWEEN CHRONIC PANCREATITIS AND MYOCARDIAL LESION. (Rus.) aramonova, E. G. (Nutr. Inst., Acad. Med. Sci. SSR, Moscow) and S. A. Tuzhilin. *Sovet. Med.*)(12):67-72, 1966.

ased upon 3 patients (women, 36-54 yr. old), it as found that in patients with chronic panreatitis the content of pancreatic trypsin participating in coagulation and anticoagulant ctivity) was increased. It is probable that oronary changes (as observed on the electroardiogram) are not purely reflex in nature, as ome authors believe, but also are biochemical in ature. Coronary changes are evidently nditioned by a disturbance in cardiac muscle etabolism and this is easily reversible with nticoagulant therapy. These changes are quite ossibly related to disturbances in electrolyte etabolism, especially K, which are often oberved in acute and chronic pancreatitis. Changes the psyche are also found, since disturbances the blood supply due to increased coagulation chronic pancreatitis involve both heart, uscle and brain tissue. An inverse relationship etween cardiac and pancreatic symptoms was ound, possibly conditioned by a disturbance of ne physiological balance among the enzymatic ystems. In addition, the hypothesis that a high rotein diet stimulates blood coagulation was erified. Thus, a high-protein diet is contrandicated in patients with chronic pancreatitis ho have increased coagulation activity, especially the presence of cardiovascular diseases. In uch cases, a high-protein diet should also nclude heparin.

411 PHOSPHOLIPASE A-A POSSIBLE DIFFERENTIATING FACTOR IN THE PATHOGENESIS OF ACUTE ANCREATITIS. (Ger.) Schmidt, H. (U. Clin. ottingen, Germany), W. Creutzfeldt and E. abermann. *Klin. Wschr.* 45(3):163-164, 1967.

rouped rats (200 g) were each inj. in the ancreatic duct with 0.6 ml of 1 of a number of reparations, all in Ringer's soln.: (1) ysolecithin, 0.2%; (2) lysolecithin, 2.0%; (3) hospholipase A from bee venom, 250 μg/0.6 ml; (4) a taurocholate, 0.4%; (5) phospholipase, 250 g/0.6 ml and Na taurocholate, 0.4%. Normal human pancreatic juice and bile mixture was obtained. Histologic preparations were made from the necrotic and apparently normal regions of the pancreas of a patient dead from acute pancreatitis. Normal human pancreatic tissue was also prepared from a healthy pancreas. The spontaneous proteolytic activity in freshly-prepared tissue homogenates was measured. Lipid extractions were made and lipid fractions quantitatively determined by appropriate methods including thin-layer chromatography. Inj. of 2% lysolecithin produced complete necrosis of the pancreas within 6 hr.; in addition, necrosis was evident in the adipose tissue of the peritoneal cavity. Despite massive necrosis the proteolytic activity was very small. Even inj. of 0.2% lysolecithin caused necrosis clearly demonstrable in histologic section. Inj. of phospholipase A alone caused no evident necrosis. Inj. of phospholipase A together with 0.4% Na taurocholate (which had very little necrotizing activity) caused the severest degree of necrosis within 1 hr. and also necrosis of adipose tissue in the peritoneal cavity. Analysis of necrotic pancreatic tissue showed the increase of lysolecithin and lysocephalin at the expense of the normal lecithin and cephalin fractions. In the necrotic pancreatic tissue of the rat, expressed as % of the phospholipids, lysolecithin was 45.3, normal, 1.6; lecithin was 19.3, normal 53.1; cephalin 7.9, normal 25.4. The human bile and pancreatic juice mixture incubated for 2 hr. at 37°C had a quantitative conversion of lecithin into lysolecithin. Normal human pancreatic tissue had only 0.3% of the extracted phospholipid in the form of lysolecithin. The necrotic pancreatic tissue of the acute pancreatitis case had 46.2% as lysolecithin, with concomitant fall in lecithin and cephalin. The non-necrotic region of the pancreas had a lysolecithin of 9.3% probably increased by autolysis, and lecithin of 43.8%.

9412 PANCREATIC REACTION DURING OPERATIONS ON THE BILE DUCTS. (Fr.) Pstruzina, J. (Charles U., Prague). *Lyon Chir.* 63(2):194-198, 1967.

Serum lipase levels were measured in McDonald U (pathologic above 0.80) during operations on the biliary routes. Altogether 68 patients were operated upon; 33 cholecystectomies, 12 of which were done without prior ligature of the bladder; 14 with ligatures, and 7 with blockage of the bladder; serum lipase rose from 0.2 to 0.5 U in the first group and remained less than 0.3 U in the other 2 groups. Among 6 who underwent transduodenal sphincterotomy, the serum lipase levels rose to over 1.00; in 4 others with this operation, protected by 30,000 Kallikrein I.U. of Trasylol and 1 g chlortetracyline, the serum lipase reached the same level but diminished more rapidly. In 25 patients who had radiomanometry, measurement of bile output and exploration of the ducts the serum lipase conc. rose to a max. of 0.45 U. In 10 nonoperated subjects and in 10 nephrectomized patients lipase values remained between 0.2 and 0.3 U. In 10 cases of Billroth I resections lipase rose rather slowly to a level of 0.48 U. The blood samples for these tests were taken hourly from the beginning of the operation. The estimation of pancreatic enzyme during surgery can aid in the early diagnosis of postoperative pancreatitis.

9413 THE SIGNIFICANCE OF "POLYMACULAR" PICTURES OF WIRSUNG'S DUCT. AN EXPERIMENTAL ANALYSIS. (Fr.) Mallet-Guy, P. (Edouard Herriot Hosp., Lyon, France), J. Féroldi, J. Murat, A. Ray and F. Abbound. Lyon Chir. 63(2):185-193, 1967.

Duodenotomy and transpapillary catheterization were done in 23 dogs, after which the entire terminal part of the pancreatic duct was cleared by dissection, incised and intubated in order to aspirate its contents and inj. into the duct under controlled pressure a fluid fulfilling 3 objectives: (1) the correct opacification of the excretory tree, (2) visual recognition of fluid diffused into the surface of the gland, (3) deposition of material in histologic sections. Such a preparation was found in 4% Chicago blue holding in suspension a small quantity of BaSO4 as an indicator of rupture when viewed under the microscope. The inj. of an isotonic saline soln. into the pancreatic duct produced edematous lesions with hyperamylasemia when the pressure reached 30 cm of H_2O. For inj. of the Chicago blue preparation a pressure of 35 cm of H2O was used except in 1 case in which the pressure was 80 cm H_2O. Immediate proof of rupture was furnished by the blue patches which appeared at the surface of the gland because Chicago blue does not diffuse through tissues (as does patent blue). In the instance where the inj. pressure was 80 cm of H_2O, the dye was diffused throughout the gland. In 25% of the cases the graphic representation of the pancreatic duct was normal; in 18 animals the picture of characteristic spotting occurred. In graphic representations of pancreatic duct ruptures do actually occur at a pressure of 35 cm of H_2O and have no clinical significance in diagnosis of chronic pancreatitis. In fact, radiography of the pancreatic duct may cause fatal pancreatitis.

9414 ESSENTIAL HYPERLIPEMIA AND ACUTE PANCREATITIS. (Ger.) Braunsteiner, H. (Med. U., Innsbruck, Austria), M. Herbst, S. Sailer and F. Sandhofer. Schweiz. Med. Wschr. 97(22):698-702, 1967.

The relationship of hyperlipemia and some form of pancreatitis has been obscure although cases are on record of the occurrence of episodes of pancreatitis in hyperlipemic individuals. Essential hyperlypemia has been observed in 36 cases in hospital for relatively long periods of time in the course of 1.5 yr. The diagnosis was made on the basis of the high triglyceride content and the characteristic changes in the chief lip fractions of the plasma. Blood was obtained in the morning after a 16-hr. fast, heparinized an centrifuged at 4°C. Lipids were extracted from the plasma and fractionated. Normal av. values established in the particular laboratory were: phospholipids, 211.7 mg%; total cholesterol, 221.7 mg%; triglycerides, 96.0 mg%; free fatty acids, 617.7 µEq/liter. Five of these 36 patients had attacks of pancreatitis, 4 during hospital observation; 2 patients had 1 attack each and 2 had recurrent attacks. During these attacks the triglycerides were in high variable conc., 18, 12, 20, 8, 11, 7 times the normal values. The phospholipid content of the plasma and also the total cholesterol were also elevated to between 2 and 3 times normal. Afte the attack the triglycerides of the plasma fell to almost normal values or only 2-3 times norma but in a few wk. the plasma triglycerides again rose to high levels. Carbohydrate metabolism was obviously disordered in at least 1 instance with very high blood sugar values and urinary excretion of sugar. This diabetic state might have been a separate and distinct condition. Some hyperlipemic patients with pancreatitis also showed high blood and urinary diastase conc. The mechanism of this pancreatitis is unknown. Cholecystitis or cholelithiasis could be ruled out as a cause in all cases. Transien hyperlipemia secondary to pancreatitis was not observed in the clinic. Pancreatitis secondary to hyperlipemia is a recognizable entity.

9415 ANIMAL EXPERIMENTS ON THE PATHENOGENES OF PANCREATITIS. (Ger.) Schmidt, H. (U. Gottingen, Germany) and W. Creutzfeldt. Verh. Deutsch. Ges. Inn. Med. 72:719-725, 1967.

Incubation of rat pancreas homogenates at pH 5.2 causes activation of proteases even in the presence of trypsin inhibitors; these proteases may be identical with those demonstrable in the pancreas of animals with pancreatitis. To prov this the pancreatic tract was inj. with an activated pancreatic homogenate. Within the first 6 hr. after inj. an interstitial edema and a WBC infiltration occurred. Necrosis appeared very seldom and then in single cells only. After 24 hr. and morphological changes had returned to normal. No increase in serum enzyme activity was seen. By contrast, the spontaneous proteolytic activity of the pancreatic homogenate was still high; this activit was much higher than that found in the pancreas of animals after an inj. of taurocholate which has caused the development of the severest type of necrosis. A parallel between the conc. of active proteases and the degree of pancreatitis does not exist. The active proteases may play a role in the lysis of necrotic pancreatic tissue. The pancreatic tract of rats was next inj. with an active preparation of trypsin; thi was not followed by an activation of proteolyti enzymes in the tissues. Within 5 min. after th inj. of the trypsin, only 2% of its activity

ned due to the influx of serum trypsin
itors strong enough to cause edema; the
action of the trypsin was upon the secre-
ducts and not upon the gland cells. The
tion of toxic substances in the pancreatic
chyma may be the cause of necrosis; an
mal compound, a hemin pigment made by
ating a mixture of trypsin and blood for
., inj. into the pancreatic tract of dogs
s the severest, fatal, hemorrhagic type of
eatitis; inj. of a fresh mixture of trypsin
lood causes a milder degree of pancreatitis.
ame results occurred when these trypsin-
experiments were repeated in the rat.
substances, such as the split products of
hospholipids, can evoke strong cytotoxic
ions.

EXPERIMENTAL TRYPTIC PANCREATITIS WITH
INDIRECT AND DIRECT COOLING OF THE
. (Ger.) Nagel, M. (Johannes Gutenberg
ainz, Germany), F. K. Kössling and W.
rsieck. Med. Welt 18(12):698-703, 1967.

reatitis was produced in 42 dogs by the
llation of 20, 10, or 2 ml of a bile-
ated trypsin soln. (0.01 g trypsin in 10 ml
l saline) incubated with bile for 24 hr. at
. Indirect cooling was done (a) by freezing
tomach (refrigerant temperature in the
on -15°C for 40 min., and (b) cooling the
ch for 4-5 hr. with the coolant at 5-10°C.
irect cooling of the pancreas the refri-
ting balloon was laid upon the gland for an
val of 50 min.; the circulating medium had
mperature of -20°C. Adjacent organs were
ected by cloths. During and after the
ation a larger or smaller vol. of brownish-
le-colored edematous fluid appeared in the
reas. Serum amylase conc. increased un-
ted to the group: (1) inj. only with
erent vol. and pressures; (2) inj. with freez-
of the stomach; (3) inj. with cooling of the
ach, (4) inj. with direct cooling of the
reas. Similar changes occurred with serum
saminases and alkaline phosphatase. The
als in Group (1) showed a massive tryptic
reatitis, with a glassy or brownish edema,
rrhage, and necrosis of regional fatty
ue; circulatory disturbances were evident
ologically as were serous cell exudation,
ortion of the lobular parenchyma, and large
small areas of necrosis. In the ducts signs
ecretory stasis, inflammatory changes, and
al tearing of tissues were apparent. Dogs
he second group showed somewhat less edema;
proliferation of cells in necrotic areas,
reorganization of tissues. The third and
th groups showed no particular differences,
er macro- or microscopic, in response to the
ct or indirect cooling of the pancreas; in
ral Groups 3 and 4 resembled Group 1. The
inj. only seemed to survive indirectly with
vol., and pressure of the instillation;
e inj. with 20 ml at 50 cm H_2O pressure died
in 6 hr., whereas those receiving 2 ml at
30 cm H_2O pressure died after 3 wk. Freezing or cooling of the stomach, or direct cooling of the pancreas did not increase the duration of survival; if anything the duration was decreased by the hypothermic technics.

9417 ROLE OF THE CANALICULI IN THE GENESIS OF ACUTE PANCREATITIS. (EXPERIMENTAL STUDY ON RATS). (It.) Falcidieno, P. (U. Genoa, Italy), E. Nicora and A. L. Bertieri. Pathologica 58(863-864):225-242, 1966.

Among rats in which the common bile duct was ligated at the level of the hepatic hilus, 2 of 20 died of surgical complications. When the 18 survivors were sacrificed on day 12, dilatation of the common bile duct above the ligature was found with no evidence of pancreatic damage. However, when the common bile duct was ligated at the point of its debouchement into the duodenum, 16 of 20 died within 4 days, and when the remaining 4 of 20 were sacrificed on day 12, their pancreas showed the same characteristics: severe vasodilatation; generalized edema, which included interlobular spaces and extended to the omentum and mesentery; generalized hemorrhagic infiltration with areas of frank necrosis. Among rats in which the common bile duct was ligated at the level of the hepatic hilus and also below the 2 points at which the pancreatic ducts empty into it, 3 of 20 died within 4 days, with necropsy findings similar to those of the second group, just cited. When 17 of 20 were sacrificed on day 12, the pancreas were significantly diminished in vol. and increased in consistency; the ducts draining into the isolated area of the common bile duct were enormously dilated and filled with clear liquid; extreme interstitial edema and proliferation of perilobular and perivascular connective tissue was accompanied by marked dilatation of both canaliculi and acini. It is concluded that intracanalicular hypertension, accompanied by hypertensive biliary reflux and structural damage to the canaliculi and acini, may play a determining role in the pathogenesis and progress of acute pancreatitis, especially when rupture of the ducts initiates a process of pancreatic autodigestion, as it must do.

9418 NEW EXPERIMENTAL MODEL OF ACUTE AND CHRONIC RELAPSING PANCREATITIS. (Rus.) Toskin, K. D. Eksp. Khir. Anest. 11(6):12-13, 1966.

After a pararectal incision of the abdominal cavity in dogs, the duodenum was resected (beneath the pylorus), and the stump was sutured and peritonealized; this was followed by formation of an anastomosis between the stomach and the first loop of jejunum. A second incision, parallel to the first, was made, and a rectangular abdominal-muscular flap was removed from the lateral abdominal wall. A hiatus was made in the duodenal mesentery, with preservation of the vascular arcade; the rectangular flap was drawn through the hiatus and sutured in place. An intestinal loop was drawn through openings formed at the ends of the shortened flap, to which it was sutured. Finally, the duodenal loop was enclosed into a cutaneous tubule by a form of Filatov's graft. The graft was pinched, and one hr. later vomiting and discomfort were noted; 3-4 hr. later there was an increase of serum amylase and lipase which reached very high levels at 15-16 hr.; excitability decreased after 8-15 hr., and the animals expired between 18-36 hr. If pinching of the graft was discontinued within 12 hr., the dogs usually survived. Pathological changes were directly dependent upon the length of time that the graft was pinched. Acute edema of the pancreas, with gradually increasing cellular infiltration of the stroma, occurred after 3-6 hr. After 15-18 hr., there was parenchymatous necrosis of variable degree. Repeated pinching of the graft led to exacerbation of pancreatitis, leading in turn to chronic inflammation and, subsequently, pronounced fibrosis of the pancreas.

9419 PANCREATITIS IN VISCERAL LUPUS
Q ERYTHEMATOSIS, DISCORD. (Ger.)
Seifert, G. (U. Hamburg, Germany), N. Heinz and A. Ruffmann. Gastroenterologia (Basel) 107(5): 317-327, 1967.

9420 ACUTE PANCREATITIS. (Pol.) Panecka, A. (1st Surg. Clin., Lublín, Poland). Ann. Univ. Curie Sklodowska [Med.] 20:249-256, 1966.

9421 ACUTE PANCREATITIS. (E.) Safley, T. J., Jr. (935 N. State St., Jackson, Miss.). J. Mississippi Med. Ass. 8(8):451-454, 1967.

9422 COMPREHENSIVE TREATMENT OF ACUTE HEMORRHAGIC PANCREATITIS. (E.) Nugent, F. W. (Lahey Clin. Found., Boston, Mass.), W. A. Atendido and S. P. Gibb. Amer. J. Gastroent. 47(6):511-517, 1967.

9423 CLINICAL TRIAL OF CORTICOSTEROID AND
ANTIENZYME THERAPY OF ACUTE PANCREAT
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Figueroa. Hosp. Vina Mar. 22(1-2):22-28, 196

9424 RENAL VASCULAR ABNORMALITIES IN ACUT
PANCREATITIS. (E.) Vogel, R. M. (V
Hosp., West Haven, Conn.) and M. Keohane. Ar
Intern. Med (Chicago) 119(6):610-616, 1967.

9425 ACUTE PANCREATITIS AFFECTING THE TRA
VERSE COLON. REPORT OF A CASE. (E.
Lukash, W. M. (National Naval Med. Ctr., Beth
Md.) and R. P. Bishop. Amer. J. Dig. Dis.
12(7):734-736, 1967.

9426 SELECTION AND TIMING OF SURGERY IN
CHRONIC RELAPSING PANCREATITIS. (E.)
Thomas, C. G., Jr. (U. North Carolina Sch. Me
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1967.

9427 DIAGNOSIS OF ACUTE PANCREATITIS. (F
Lagache, G. (City Hosp., Lille, Fran
and B. Combemale. Lille Med. 12(5):629-632,
1967.

9428 ACUTE PANCREATITIS. REPORT ON TREAT-
MENT AND THE USE OF TRYPSIN INHIBITO
(Por.) Wazen Da Rocha, J. Hospital (Rio) 71
1313-1321, 1967.

9429 CHRONIC PANCREATITIS IN NEWBORN INFA
DURING THE SUCKLING PERIOD. (Bul.)
Pavlov, K. (1st City Hosp., Sofia.). Akush.
Ginek. (Sofia) 6(2):161-168, 1967.

9430 DIAGNOSTIC VALUE OF THE STARCH TOLER
TESTS. (Cz.) Ronský, R. (Charles U.
Prague), E. Stuchliková, L. Dolejšková and M.
Dvořák. Sborn. Lek. 69(7):214-218, 1967.

See also abstract no.: 9205

STUDIES WITH RADIOACTIVE COPPER (^{64}Cu
AND ^{67}Cu) IN RELATION TO THE NATURAL
RY OF WILSON'S DISEASE. (E.) Osborn, S. B.
s Coll. Hosp. Med. Sch., London) and J. M.
e. Lancet 1(7486):346-350, 1967.

take of radioactive Cu (^{64}Cu, ^{67}Cu) was
d in 24 patients with Wilson's disease:
in the asymptomatic stage of the disease,
signs and symptoms of hepatic disease, 9
urological symptoms but had received little
treatment, and 8, originally presenting
eurological disease, who had been receiv-
nicillamine for periods varying from 18 mo.-
Three of the latter were included in a
of 9 studied before the start of treatment.
l studies were made on 11 persons heterozy-
or the gene of Wilson's disease and on 17,
gous normal. The percentage of inj. radio-
Cu in the liver at 2 hr. was greatest in
ls, av. 59% (range 34-87%); the mean figure
terozygotes was 55% (range 25-65%). In
omatic Wilson's disease, the mean was 50%
42-61%); in hepatic Wilson's disease it
llen to 40% (range 28-52%), but in patients
isturbance of the CNS it was very low at
ange 14-27%). Patients who had received
ent had a higher av. uptake of 33% (range
) than those with untreated neurological
e. At 24 hr. the pattern of liver uptake
anged, the highest figures for liver Cu
found in patients with asymptomatic Wilson's
e, with a mean of 72% (range 48-96%);
were followed closely by heterozygotes,
n av. of 70% (range 49-83%), whereas in
ls the mean figure of 65% (range 35-85%)
little increase over the 2-hr. figure.
ts with the hepatic stage of Wilson's
e approached the normal value with a figure
(range 43-66%), whereas untreated neurolog-
atients again had a very low uptake, mean
ange 17-55%), and after treatment this
ed to a relatively high figure of 59%
36-92%). Determinations of the liver/thigh
at 15 min. showed a pattern of results
r to liver uptake at 2 hr., the highest
being found in controls and heterozygotes,
e lowest in untreated neurological patients
ome degree of improvement after treatment.
for plasma radioactivity at 2 hr.
sed as % of inj. Cu/liter showed very
r values for all groups in which liver Cu
was more than 40% at 2 hr., i.e., all
ts except those with untreated neurological
's disease. In controls, heterozygotes
tients with asymptomatic or hepatic Wilson's
e, mean plasma radioactivity at 2 hr. varied
n 1.2% and 1.8%, whereas in untreated neuro-
l patients the mean was 3.7%/liter; the dif-
e between the latter and other groups was
ighly significant. These findings suggest
he uptake of Cu by the liver is high in the
ptomatic stage of the disease; as the illness
sses through the hepatic to the neurological
there is a progressive fall-off in this
on by the liver, presumably reflecting saturation of the available binding sites for the metal. As the liver becomes saturated with Cu the plasma is cleared more slowly, and Cu can be detected more readily in other tissues. The capacity of the liver to conc. Cu can be restored, at least in some patients, by adequate long-term treatment with penicillamine.

9432 HEPATIC LESIONS IN PRECLINICAL WILSON'S DISEASE. IMPORTANCE OF DETECTION.

(Fr.) Bocquet, L. (Hosp. Sick Child., Paris), H. Jérome and R. Turpin. Sem. Hop. Paris 43(21): 1369-1374, 1967.

The determination of plasma ceruloplasmin levels and hepatic Cu conc. in specimens obtained by Menghini puncture-biopsy revealed the existence of preclinical Wilson's disease in 4 subjects (1 male and 3 female; age 3.5, 2.5, 10, and 10 yr., resp.) belonging to 3 groups of siblings (6, 2, and 4 subjects, resp.; total examined, 12 subjects). The 4 patients were asymptomatic but presented plasma ceruloplasmin levels (mg/100 ml of plasma) of 1, 1, 7, and 2, resp., and hepatic Cu levels (μg/g dry wt.) of 1571, 1322, 1389, and 764, resp. In addition, these patients presented important alterations of the cytoplasm and nucleus. The cytoplasm was granular and contained irregularly-arranged steatotic vesicles (minute in 2 patients and large in 2). Granular, yellowish, pigment deposits were observed in 1 patient. Small, intranuclear vacuoles were observed in all patients. Hepatocyte alterations included cell lysis in 2 patients and double nucleus in all. Fibrosis was present in 3 patients, while monocytic infiltration of portal spaces was slight in 2 and moderate in 2. Histochemical studies showed no Cu in Kupffer cells and epithelial cells of the bile ducts. Acid phosphatase determination of pigment granules revealed them to be lysosomes. The importance of early treatment with D-penicillamine is stressed. Fever and erythematous skin rash were observed in 3 of the 4 patients during treatment. The importance of early detection and continuous treatment is emphasized.

9433 STUDIES ON LEVELS OF PENICILLAMINE-INDUCED CUPRIURESIS IN HETEROZYGOTES OF WILSON'S DISEASE.

(E.) Tu, J.-B. (US Naval Med. Res. Unit No. 2, Taipei, Taiwan) and R. Q. Blackwell. Metabolism 16(6):507-513, 1967.

When the urinary Cu excretion and plasma Cu levels of 10 patients with Wilson's disease (homozygous group) were compared with that of 5 sets of parents of patients with Wilson's disease (heterozygote group) and 26 normal controls before and after 1 g oral doses of DL-penicillamine after the morning meal a diagnostic distinction was seen which would separate the heterozygote group from that of the homozygous one. The mean values for the urinary Cu excretions of the 3 groups before penicillamine differed significantly from each other: the controls ranged from 6-57 µg/24 hr., the heterozygote group, 19-120 µg/24 hr. and the homozygote group 120-560 µg/24 hr. All subjects in the 3 groups showed distinct increases in their urinary Cu excretions after ingestion of 1 g of penicillamine and here the ranges of the homozygotes and heterozygotes were completely separated; the mean for the 2 groups was 2330 µg/hr. and 1000 µg/hr, resp. This suggests a slight tendency for tissue Cu accumulation in the heterozygote group. When these values are plotted with total plasma levels the 2 groups were even more clearly separated. In both groups the urinary Cu excretion before or after the drug appeared to be independent of the individual's plasma Cu level. The range of the normal homozygote controls still overlapped with that of the heterozygote group, but the mean was significantly lower.

9434 DEMYELINATING PERIPHERAL NEUROPATHY AND LIVER DISEASE. (E.) Dayan, A. D. (Gen. Hosp., Southampton, England) and R. Williams. Lancet 2(7507):133-134, 1967.

Of 10 patients (8 men, 2 women; 38-64 yr. old) studied by nerve biopsy or at autopsy, 4 had alcoholic cirrhosis, 2 had cryptogenic cirrhosis, and 1 each had partial nodular transformation of the liver, active chronic hepatitis, hemochromatosis and acute hepatic necrosis. Neuropathy was mild and apparent only in the lower extremities; signs were restricted to absent knee or ankle jerks with or without sensory loss. A sural-nerve specimen was obtained at biopsy in patients with a clinically apparent neuropathy or at necropsy. Evidence of collateral circulation was found in 4 patients, 1 of whom had a lienorenal shunt for 15 yr. By examination of isolated teased nerve-fibers, evidence of segmental demyelination was found in all nerves examined from each of the 10 patients. It is suggested that the nerve damage might have been due to unidentified toxic metabolites or to disordered insulin metabolism caused by the liver damage.

9435 INFLUENCE OF PARTIAL HEPACTECTOMY ON METASTASES OF WALKER-256 CARCINOMA IN PARABIONT RATS. (Rus.) Khundanov, L. L. (Inst. Exp. Biol., Acad. Med. Sci., Moscow) and I. N. Maiskii. Biull. Eksp. Biol. Med. 63(3):104-106, 1967.

Under conditions of parabiosis (performed by peritoneal anastomosis) in male, August-strain rats (60), hepatectomy stimulated the metastatic process of ascitic carcinoma Walker-256; in addition, formation of metastases was more intensive with a larger inoculum of tumor cells, and the time of traumatization had a significant effect on the metastasizing process but the
length of parabiosis had no effect on it. In
Group 1 (270 days of parabiosis), with hepate
tomy in partner B performed simultaneously wi
the inoculation of 150,000 or 250,000 tumor
cells to partner A, the av. number of metasta
in the liver of partners A and B was 33.0 and
1.7, or 56.3 and 3.7, resp. In Group 2 (14 d
of parabiosis), with hepatectomy in partner B
performed 1 mo. before inoculation of tumor
cells (the same quantity) to partner A, the a
number of metastases was 38.6 and 0, or 57.8
0, resp.; in Group 3 (14 days of parabiosis),
hepatectomy in partner B performed simultaneo
with the inoculation of tumor cells to partne
the av. number of metastases was 38.0 and 2.0
54.3 and 4.6, resp. The av. number of liver
metastases in controls (who were not hepatect
mized) of Group 1, in partners A and B, resp.
was 36.0 and 0 for the smaller inoculum and
46.0 and 0, resp., for the larger inoculum.
Group 3, resp. values were 40.5 and 0 for the
smaller inoculum and 49.5 and 0 for the large
inoculum. In Groups 1 and 3, the metastatic
nodes were larger in partner B.

9436 CHEMOTHERAPY FOR MALIGNANCY OF THE
LIVER BY SHORT-TERM DIRECT INFUSION
THE HEPATIC ARTERY. (E.) Farmer, R. G.
(Cleveland Clin., Ohio), E. J. Filson and E.
Buonocore. Cleveland Clin. Quart. 34(2):
89-95, 1967.

A satisfactory technic is described for intra
hepatic arterial cancer chemotherapy, but the
results obtained on 16 patients with malignan
neoplasms, either primary or metastatic,
indicated that the treatment was unsatisfacto
Of the 16 patients, none achieved a true
objective remission from the disease and only
had a subjective response with relief of pain
and improvement in performance status when
evaluated 6 wk. after infusion. These 8 also
survived longer than 6 mo. but it is question
if this was due to the infusion, as they
received maintenance chemotherapy during this
time. For the infusion, 5-fluorouracil (15 m
body wt. was admin. daily over a 12-hr.-perio
7-11 days in 14 cases (wherein the most commo
lesion was carcinoma of the colon) while 2
others (1 with malignant melanoma and 1 with
myosarcoma of the stomach) received a daily
combination of 5 mg of 4-amino-N-10-methyl
pteroylglutamic acid and 1.5 mg/kg of body wt
of cyclophosphamide. The interval between
diagnosis and infusion ranged from just short
afterward to as long as 7 yr. later. The
series comprised 11 men and 5 women, whose ag
ranged from 32-73 yr., who previously had not
received treatment with the exception of 1 ca
of roentgentherapy of several mo. duration an
1 case of systemic admin. of chemotherapy.
general, the infusion was well tolerated.

9437 HEPATOMAS OF THE MOUSE. 1. HEPATOM
IN ONE LINE OF ALBINO MICE. (Fr.)

illon, J. C. (Pasteur Inst., Paris), I. ouroulinkov and M. Guérin. Path. Biol. (Paris) (5-6):241-249, 1967.

ring observations on cutaneous cancer in mice, ecords were kept on hepatic tumors also occur-ng; 726 males and 715 females were autopsied d liver tumors were found in 106 males (14.6%) d 17 females (2.4%). The first tumors occurred males aged 12-13 mo.; these first such owths did not appear in the females until -21 mo.; the greatest incidence for both sexes s during mo. 22 and 23. These spontaneous mors showed no preferential localization; in instances the tumors were multiple and varied om 1-30 mm in diameter, mostly spherical, and ll delineated. They had a pulpy homogenous nsistency, differentiated from the normal renchyma by their clearer color and richer rface vascularization; the larger ones were rked by creases and hemorrhagic cavities or d zones of necrosis. Only 7 possible metastases re observed in 6 males and 1 female; small dules on the lung and in 1 case metastases in e perirenal adipose tissue. Of the total 123 mors, 104 were examined histologically. The mors were encapsulated with connective tissue; e tumor tissue itself consisted of slightly attened hepatocytes; in some instances it was ssible to distinguish peripheral and central nes. The cells of the tumor contained cyto-lasmic inclusions, spherical, hyaline, eosino-ilic, described as waxy bodies; these were ery numerous and some seemed to possess a entral kernel. The cells of the central zone f the tumors were without waxy bodies and eemed like normal hepatocytes; the mitotic igures favored the inclusion of these tumors in e adenomas. The older tumors showed large areas f necrosis, hemorrhage, fatty infiltration, and yeloid bodies; giant cells were sometimes noted. ssible etiologic factors are discussed. It is uggested that the mouse is an excellent subject r studies of factors associated with spontaneous umor development.

438 VARIOUS ASPECTS OF HEPATIC FUNCTION IN THE AGED SURGICAL PATIENT. (It.)
e Vincentiis, E. (U. Naples, Italy), B. Tardio nd B. Papa. G. Ital. Chir. 22(4):437-446, 966.

epatic function was studied in 150 surgical atients divided into 3 groups according to age: 0-44 yr. (Group 1); 45-64 yr. (Group 2); 65-80 r. (Group 3). Besides the Takata-Ara and underly-Wuhrmann tests of hepatic function, the rinary excretion of N_1-methylnicotinamide was etermined (modified Huff-Perlzweig fluorimetric ethod) basally and after oral loading with icotinamide alone (200 mg/day twice), then icotinamide (same dose) and methionine (2 g) or 2 days. Basal values of urinary excretion f N_1-methylnicotinamide of patients on normal ospital diet were practically the same in atients of Groups 1 and 2, but were perceptibly lower in patients of Group 3. Hepatic function tests were positive in 10% of patients of Group 1, in 32% of Group 2, and in 45% of Group 3. After loading with nicotinamide, urinary excretion of N_1-methylnicotinamide increased markedly in patients of Groups 1 and 2 without further increase after the addition of methionine. Patients of Group 3 had a very moderate increase in urinary excretion of N_1-methylnicotinamide after nicotinamide loading, but a very marked increase (similar to that seen in patients of the other 2 groups after nicotinamide) after the association nicotinamide-methionine. Results indicate normal methylating ability in patients between 20 and 64 yr. old, and loss of methylating ability in patients of Group 3. It is concluded that a more intense vitamin and liver protective therapy is needed in older surgery patients.

9439 EXPERIMENTAL STUDIES OF PROCEDURE IN ORTHOTOPIC HOMOLOGOUS TRANSPLANT OF THE LIVER IN DOGS. (It.) Abbate, M. (U. Naples, Italy), A. Infranzi, R. Nigro, C. Lombari, T. Masturzo, D. Mori and G. Masturzo. Gazz. Int. Med. Chir. 72(9):736-778, 1967.

Among 10 dogs subjected to conventional methods of orthotopic, homologous liver transplant, operative times ranged from 3.25-5 hr.; the period of total ischemia ranged from 45-60 min.; that of partial ischemia, for 60-110 min. One of the 10 died during surgery; 2, immediately after surgery; 3, within 4-12 hr.; 2, within 24 hr.; 2, on the third and fourth day, resp. Among 10 other animals subjected to the same operation, but with revascularization of the transplanted organ before anastomosis was completed, achieved by joining the hepatic arteries of the donor and recipient, operative times ranged from 3-4.5 hr.; total ischemia lasted for 40-60 min.; partial ischemia, for 60-100 min. Two of 10 died during surgery; 3, within 3-12 hr.; 2 within 24 hr.; 2, on the third and fourth days, resp.; 1 on the fifth.

9440 EXPERIMENTAL HOMOTRANSPLANTATION OF THE LIVER. (Rus.) Lopukhin, I. M. (2nd Moscow Med. Inst.), I. E. Berezov, I. V. Egorov, A. S. Ermolov, E. M. Kogan, S. M. Kremli, K. M. Lakin, M. D. Lapin, I. M. Sapelkina, N. M. Khait, E. M. Iukhtina and E. E. Udovskii. Eksp. Khir. Anest. 11(6):3-11, 1966.

A right-sided flap thoraco-abdominal approach with resection of the arcus costarum and ribs 8-11 at the scapular line permitted a better approach to the liver and its vasculature in 51 mongrel dogs; in these animals, the vena cava was resected and sutured into the lower end of the liver, while its upper segment was fixed with clamps. Hypothermia, or perfusion of the isolated liver with a cooled fluid through the portal vein and hepatic artery, preserved the viability of the graft; in this manner, a uniform cooling of up to 7.5-10° during a period of 15-20 min. was obtained. Transplantation of the donor's liver to the recipient without removal of its own liver was attempted in 22 dogs. In 16, the liver was grafted into the left half of the abdominal cavity with or without removal of the spleen; 4 died during surgery and 12 died 4-52 hr. after surgery, of which 8 were due to hemorrhage developed from the overfilling of the donor's liver with blood. In 6 dogs, the liver was grafted into the right iliac region and 2 of these died in the first day of the experiment from blood outflow block and hepatic bleeding, while 4 survived from 2-8 days, showing a preserved function of the liver. Removal of the liver was accompanied by an increased fibrinolytic activity of the blood, as revealed in 26 dog-donors; with high fibrinolysis there was no clotting. In most dogs after implantation of the second liver, blood coagulation approached initial values or was increased; the latter occurrence predisposed to thrombus formation, which could be reduced by anticoagulants. Within 2 days after surgery the implanted liver increased in size and was dense and plethoric; toward 4-7 days, its size decreased, and remained dense showing some small hemorrhagic foci. Histologic study revealed the following changes in the donor's liver: destruction of the parenchyma, nuclear pyknosis, cellular vacuolization, vascular infiltration and mononuclear infiltration of the vessels. In the recipients' liver, only slight structural changes were seen; edematous parenchyma, vacuolization and destructive processes in the cells of the organ were slight.

9441 HETEROTOPIC LIVER TRANSPLANTATION AFTER BILIARY OBSTRUCTION. (E.) Gliedman, M. L. (U. New York, Downstate Med. Ctr., Brooklyn), L. Popowitz, J. Pangan, P. K. Kottmeier, K. E. Karlson, A. S. Josephson and S. Minkowitz. J. Pediat. Surg. 2(2):144-154, 1967.

Following cholecystostomy and construction of an external biliary fistula, auxiliary livers derived from puppies were grafted into adult dogs, with and without concomitant immunosuppressive therapy with azothioprine, methotrexate, actinomycin-C, prednisone or radiotherapy, alone or in various combinations, or concomitant treatment with ^{35}S-methionine, epsilon-aminocaproic acid or antilymphocyte serum. The most effective immunosuppression was obtained by pretreatment with azothioprine and prednisone (each at 100 mg/day four times), followed by transplant and then by azothioprine (6 mg/kg/day), prednisone (100 mg/day), methotrexate (0.1 mg/kg every other day) and actinomycin-C (7-10 μg/twice wk.). The longest graft survival was 1 mo., with complete absorption of the rejected graft by surviving animals within 6 wk. after cessation of function. Some animals under immunosuppression survived graft rejection and absorption, although these were uniformly fatal in untreated animals. All immunosuppressed animals showed a gradual loss of hepatic tissue and vol. in the transplanted liver, accompanied by fibrinoid degeneration in the arterial wall. In a correlative study, karyotypes of peripheral blood leukocytes of the dog, dingo and coyote were indistinguishable (78 XX,XY); the karyotype of the fox was 38 XS, XY; that of the pig was 38 XX, XY. Immunoelectrophoretic studies also confirmed complete serologic cross-reactivity between the dog and fox. When 7 coyote and 5 dingo liver transplants were made into dogs, the longest survival was 12 days. When 14 successful fox-to-dog transplants were made, the longes period of graft function under intensive immunosuppression was 22 days, with survival of 5 of 14 animals. Swine-to-dog transplants were uniformly and rapidly fatal. Note is made that the functioning of the auxiliary, transplanted liver could not be assayed satisfactorily by liver function tests of the host, because the host's liver masked graft dysfunction and the immunosuppressive agents employed were hepatotoxic in their own right.

9442 HETEROTOPIC AUXILIARY LIVER TRANSPLANTATION. PART II. A TECHNIQUE FOR HETEROTOPIC PARTIAL LIVER HOMOTRANSPLANTATION IN DOGS. (E.) Van Der Heyde, M. N. (Univ. Hosp., Leiden, Netherlands). Arch. Chir. Neerl. 18(4):285-291, 1966.

Dogs received 1,000,000 U penicillin and 125 mg tetracycline daily for 5 days before operation. Neither donor nor host received any other drugs, especially immunosuppressive agents. A midline incision was made under anesthesia. Splenectomy was performed; the distal portion of the inferior vena cava dissected without ligating lumbar veins; the right iliac artery was dissected and freed. The left carotid artery of the anesthetized donor was cannulated for rapid exsanguination. After midline laparotomy, the spleen and stomach were displaced upwards and to the right, and the celiac, splenic and left gastric arteries were exposed on the left. The latter 2 were ligated and cut; the celiac dissected free; the first 3-4 cm of the hepatic artery dissected free without removal of surrounding lymph vessels and nerve fibers. Division of the hepatoduodenal ligament was followed by ligation and division of the right hepatic duct, common bile duct, pancreaticoduodenal artery and pancreaticoduodenal vein. The hepatic artery and portal vein were dissected free. The right liver lobes were displaced, the inferior vena cava exposed. A polyethylene catheter (diameter 2 mm) was connected to physiological saline (15°C with 1 g/500 ml procaine). The superior mesenteric artery and portal vein were ligated; the catheter quickly inserted in the latter in the direction of the liver hilus; the portal vein divided; the donor exsanguinated after perfusion began. The celiac artery was clamped at its aortic origin and divided obliquely; a thoracic midline incision was made; the diaphragm

:tioned just in front of and around the vena va, which was clamped proximally and distally the liver. The liver was then removed entirely th the retrohepatic vena cava. The gallbladder s incised to prevent bile stasis. The smaller ft hepatic vein of the transplant was ligated; e larger one divided on the liver surface; the ver rotated to expose the hilus; the right anch of the portal vein ligated and cut. The ssue bridge between the right and left lobes s cut, the vena cava and right lobes separated from the transplant; the donor's hepatic in anastomosed to the host vena cava; the ght iliac artery anastomosed end-to-end to the ansplant celiac artery. Careful hemostasis llowed. The operation is interrupted to enable st to recover from vascular increase; 300-500 donor blood is given. The operation is completed with cholecystojejunostomy. The simplic- / and size advantages of this technic are ressed.

43 HETEROTOPIC AUXILIARY LIVER TRANSPLANTATION. PART III. FUNCTIONAL COMPETITION JSE OF ATROPHY OF THE AUXILIARY LIVER TRANS- ANT. (E.) Van Der Heyde, M. N. (Univ. Hosp., iden, Netherlands), M. Vink, H. Stol, H. W. :ke and S. W. Schalm. Arch. Chir. Neerl. (4):293-298, 1966.

terotopic liver transplantation was performed Group 1 (10 dogs). Cholecystojejunostomy was t performed but bile drainage was accomplished cannulation of the cystic duct. In Group 2 (20) terotopic transplantation was accomplished with olecystojejunostomy, and the host liver was ovided with an end-to-side portacaval shunt. attempt was made to achieve rapid complete struction to drainage of bile from host liver cholecystectomy and ligation and division of trahepatic bile ducts, separately, close to e liver hilus. Immunosuppression was by admin. azathioprine, 6-8 mg/kg from day of operation rough the fourth postoperative day, 3-5 mg/kg days 5-20, 2-3 mg/kg subsequently; Actinomycin, µg i.v. on day of operation and postoperatively days 5, 10, 15, 20, 25.; prednisone initially r a brief period where a rejection reaction s considered possible; splenectomy in all ses. Antibiotics used were: donor, 1,000,000 penicillin and 125 mg tetracycline daily for 5 ys immediately before operation; host, same se for 5 days postoperatively and 1 g neomycin o. during 3 preoperative days. Wt. loss companying immunosuppressive treatment was mbatted by a diet of 2500 calories daily 0-30 g protein). In Group 1, 1 survived only days, the rest for 15-35 days. Bile flow of 6 ml/hr. was relatively constant, diminished 5-7 days, and stopped after 11. There was no rrelation between bilirubin conc. and decrease bile production. After the end of bile oduction, liver punctures always showed normal croscopic structure without signs of rejection. Group 2 there were 6 early deaths from related causes, 2 rejections, 3 atrophies, and 9 retained wt. or hypertrophied. In both groups, conditions for transplantation were unfavorable because dogs had to overcome a period of hypothermia and ischemia, immunological aggression, and portal ischemia. Operation on host liver made transplant more favorable physiologically than host liver. Results showed that liver transplants can continue to function without perfusion with portal blood.

9444 PATHOLOGICAL, ANATOMICAL, HISTOLOGIC, AND HISTOCHEMICAL CHANGES IN LIVERS PERFUSED WITH HETEROLOGOUS BLOOD. (It.) Ferraris, R. (U. Ferrara, Italy), G. Motta, P. Georgacopulo and S. Guerrieri. Minerva Chir. 22(5):238-243, 1967.

Isolated fragments of swine liver, derived *in vivo*, were washed preventively with heterologous blood throughout the entire isolation procedure, then perfused directly with cooled, oxygenated, heterologous blood for varying periods of time prior to pathologic, histologic and histochemical analysis. It was found that such fragments could be kept alive for presumably indefinite periods of time, with normal metabolic function and with no evidence of tissue damage, provided an adequate O_2 supply was available from the beginning and maintained without interruption. It was also found essential to maintain the pH of the heterologous blood supply, which tended to drop spontaneously during the course of perfusion, within a range of 7.2-7.4. Any drop below 7.2, the minimal level compatible with normal O_2 transport, led very quickly to irreversible cell damage. (See also: 9445 and 9446.

9445 IMMUNOLOGIC CONSIDERATIONS IN PERFUSION OF THE ISOLATED LIVER WITH HETEROLOGOUS BLOOD. (It.) Azzena, G. F. (U. Ferrara, Italy), R. Ferraris and E. Tabone. Minerva Chir. 22(5): 244-246, 1967.

In host dogs whose blood supplies were used for 150-min. isolated perfusions of swine livers, no antiliver antibodies could be demonstrated, even after the experiment had been repeated twice, at intervals of 25 days. However, the host developed antiserum antibodies against serum elements remaining in the vascular system of the perfused organ, despite prior washings with saline. These were demonstrable after a single perfusion, increased progressively following a second and a third. There was no evidence of immune response to tissue elements of the perfused organ. (See also: 9444 and 9446.

9446 ELECTRON MICROSCOPIC STUDIES OF SWINE LIVER PERFUSED WITH HETEROLOGOUS BLOOD. (It.) Martines, G. (U. Ferrara, Italy), G. F. Musacci, G. Motta, R. Ferraris and P. Georgacopulo. Minerva Chir. 22(4):153-156, 1967.

Electron microscopic studies were made of isolated swine liver perfused for 15 and 150 min. with dog blood. (See also: 9444 and 9445). No significant changes were evidenced after 15-min. perfusion. After 150 min., hypertrophy and swelling of the mitochondria appeared to confirm a blockage of oxidative phosphorylation. The vol of the nucleus was decreased in relation to the cytoplasm, with conc. of chromatin along the edges of the nuclear membrane. The cytoplasm contained autophagocytic vacuoli. There were clumpings of ergastoplasmic membrane in the cytoplasm and the canaliculi were extremely short and abnormally distributed. A virtually complete depletion of cellular glycogen was also in evidence. Note is made that none of the changes reported appeared to be sufficiently advanced to jeopardize survival of the isolated organ.

9447 SPLANCHNIC HEMODYNAMICS AND THE VARIOUS DEVELOPMENTAL PHASES OF FATTY DEGENERATION OF THE LIVER. (It.) Bevilacqua, G. (U. Milan, Italy), G. Gallioli and A. Lotto. Minerva Chir. 22(6):322-334, 1967.

In an effort to clarify the hemodynamic changes which usually accompany fatty liver, histological, histochemical and ultramicroscopic studies were performed in 25 patients with fatty liver (11 with chronic steatotic hepatitis, 8 with cirrhosis due to steatosis, 4 with pure steatosis, and 2 with microcicatricial fatty liver. Differing liver morphology was found in these cases: massive reticuloendothelial infiltration, lipid infiltration of hepatocytes, increased density and rigidity of connective tissue, and differing appearance of hepatic sinusoids. In some cases, irregular, large, areas of sinusoidal dilatation and congestion were frequent; in others, the vascular areas of the lobe were collapsed. This variability of sinusoidal resistance leads to sporacic changes in portal pressure. In the author's series, the usual effect of steatosis on the vascular network was represented by portal hypertension with increased suprahepatic occlusion pressure. In only 1 case was the increase very slight, probably because of a prevalent presinusoidal localization of the circulatory block. In 1 patient, a long period of treatment with hepatoprotective agents and abstention from alcohol was followed by a decrease in portal hypertension and return to normal of suprahepatic occlusion pressure values; subsequent ingestion of large quantities of alcohol caused a flare-up of the degenerative disease with recurrence of portal hypertension, increased suprahepatic occlusion pressure, and massive hemorrhage. It is concluded that the lobular changes induced by fatty degeneration are reflected hemodynamically by a block of portal flow at various levels and consequent increased portal hypertension. In initial stages, portal pressure values may change depending on the course of the degenerative disease. However, these variations become less frequent due to the prevalence of sclerotic changes and lobular regeneration, until a definite, irreversible hypertensive state is reached. Three illustrative case reports are included.

9448 THE EFFECT OF CAFFEINE ON FAT METABOLIS IN LIVER DISEASE. (Ger.) Zeller, W. (U. Erlangen-Nuremberg, Germany) and H. P. T. Ammon. Z. Gastroent. 5(2):84-89, 1967.

The blood levels of free fatty acids in response to caffeine were studied in 20 patients with different disorders of the liver, all with more or less depressed hepatic function. Caffeine (250 mg) was admin. by inj. and p.o. in fasting individuals; blood samples were taken at 0.5 hr intervals for 3 hr. and 3 lipid fractions determined: (1) free fatty acids, (2) esterified fatty acids and (3) total cholesterol. Blood samples were also taken from the hepatic patients at 4, 6, 8, and 10 hr. after admin. of caffeine. Ten normal subjects were treated in exactly the same manner; blood samples were collected for 3 hr. only. The same procedure was followed in 5 control persons who received caffeine-free preparations. All requirements of a double blind test were fulfilled. After i.v. inj. of caffeine into healthy subjects, the av. free fatty acid conc. rose from 0.48 to 0.83 μEq/ml in 2 hr., falling to 0.63 μEq/ml at 3 hr. still significantly increased. Inj. of caffeine free physiological saline caused no change beyond the limits of experimental error. The inj. of caffeine into the liver patients caused a rise of free fatty acids from the av. 0.92 μEq/ml (a high value) to 1.94 μEq/ml; 10 hr. after inj. the serum level of free fatty acids was still higher than before the test. Oral admin. of caffeine in the controls caused an av. rise from 0.44 to 1.03 μEq of free fatty acids in 3 hr.; the comparable figures for the liver disease patients were a rise from 1.14 to 1.69 μEq/ml of free fatty acids in 3 hr. The conc. of esterified fatty acids and total cholesterol in the serum of the liver patients were greater than normal but were not influenced by caffeine, at least in a dose of 250 mg. These tests were repeated on 2 other groups of 32 liver patients and 31 healthy persons with the same results.

9449 AN ENCEPHALITIC SYNDROME ACCOMPANYING FATTY DEPOSITION IN THE LIVER. (Ger.) Čihula, J. (Fac. Med., Hradec Kralove, Czechoslo kia), I. Drašner, I. Dvořáčková, V. Vortel and V. Hroch. Z. Ges. Inn. Med. 22(1):14-21, 1967.

Eleven cases of a syndrome among infants and young infants are reported; the chief clinical symptoms have been (1) emesis, (2) mental confusion, (3) disturbances in breathing, (4) cramps, (5) changes in muscle tonus, (6) fever, (7) changes in visual reflexes, (8) changes in shape and reaction of pupils, (9) trismus, (10) circulatory disturbances, (11) swelling of the

er, (12) exanthema; (1-3) occurred in 11 sub-
ts, (4 and 5) in 10, (6-8) in 9, and (9) in
(10) in 5, (11) in 4, and (12) in 2 patients.
laboratory findings were diverse in many
pects; WBC were high in some cases, normal in
ers; in 1 case a blood glucose conc. of 19.6
was reported whereas another patient had
mg% and in a third blood sugar was reported
mg%. Similar variations occurred in other
ameters; in 2 cases the serum transaminases
e found to be high. The main pathological,
tologic and anatomic findings were fatty
iltration of the liver, cerebral edema, and
erplasia of the lymphatic system; the liver
wed round cell invasion. Macrophages were
sent in the alveoli, in the bronchi, the brain
in the sinuses of lymph nodes. In 1 case
e 3 adenovirus was isolated from 3 different
sues. It is suggested that a virus is the
se of this fatal syndrome. The clinical
gnosis was acute encephalitis; 8 had been
osed to hepatitis. The duration of the ill-
s was short, 3-10 days (av. 6 days); 6 patients
e male, 5 female; there was no special
sonal incidence in these cases.

0 DIAGNOSTIC SIGNIFICANCE OF THE EMBRYO-
SPECIFIC α-GLOBULIN DETERMINATION IN
BLOOD SERUM OF HEPATOMA PATIENTS. (Rus.)
arinov, Iu. S. (Astrakhan Med. Inst., USSR)
A. M. Nogaller. Vop. Onkol. 12(12):26-29,
6.

ults of clinical, immunochemical and patho-
tological analysis of 106 patients with
ious liver diseases (cancer, 17; viral
atitis, 24; chronic hepatitis, 18; cirrhosis,
acute and chronic cholecystitis, 6;
inococcus, 2; and abscess, 2) revealed that
embryospecific α-globulin is a valuable method
the intravital diagnosis of hepatoma. In 5
ients (42-59 yr. old) who expired 1 mo.-1.5
after the onset of clinical symptoms of
atoma (3 with cirrhosis, 2 without cirrhosis),
content of embryospecific α-globulin varied
ween 2.6-5.3%, as compared to 100% in the
wk.-old embryo. Apparently the embryo-
cific α-globulin also appeared in the serum
early stages of the hepatoma; this can be of
erest for the earlier diagnosis of hepatoma.
3 patients with cholangioma, the embryo-
cific α-globulin could not be detected in the
um. The embryospecific α-globulin test was
ative in 9 patients (37-53 yr. old) with
astatic cancer of the liver (metastases from
stomach in 3, from the intestine in 2, from
lungs in 2, and from the pancreas in 2) of
o.-2 yr. duration. More than 200 tests on
sera of healthy persons gave negative re-
ts for the embryospecific α-globulin test.

1 COMPLEMENT-FIXING LIVER ANTIBODIES. II.
OCCURRENCE IN A MATERIAL OF PATIENTS
H CHRONIC HEPATITIS. (E.) Norup, G. (State
um Inst., Copenhagen.). Acta Path. Microbiol.
nd. 69(3):404-416, 1967.

Complement-fixing antibodies were evident in the sera of 29.6% of 135 patients with hepatic cirrhosis in the presence of suspensions of normal human liver biopsies and/or normal liver from rhesus monkeys. Of those with positive results for these 2 liver antigens, 93% were from patients with chronic hepatitis of viral or unknown etiology. Of the remaining 3 positive sera, 2 were from patients with alcoholic cirrhosis and 1 from a patient with secondary biliary cirrhosis. The study included 48 patients with posthepatic cirrhosis, 50 with cryptogenic, 29 with alcoholic and 8 with biliary cirrhosis; 56% of the patients were over 60 yr. of age. Of 92 sera tested, (including the above-mentioned positive ones) 14 reacted positively to normal human liver necropsy inj. In addition, a positive complement fixation was also found in 18.8% and in 14.1% of the sera using normal kidney tissue and thyrotoxic thyroid glands, resp., as antigens. The complement-fixing liver antibodies were nonspecific and nonorgan specific. The pattern of organ reactivity was constant for a given patient, but varied arbitrarily from 1 patient to the other.

9452 ANTI-GAMMA-GLOBULIN FACTORS IN LIVER DISEASES. (Ger.) Meyer Zum Büschenfelde, K. H. (Johannes Gutenberg U., Mainz, Germany), U. Hopf and V. Bokisch. Verh. Deutsch. Ges. Inn. Med. 72:683-688, 1967.

A search for antibodies was carried out on the sera of 169 patients with defined liver diseases, acute hepatitis, chronic hepatitis, and liver cirrhosis. The following tests were applied to the serum of each patient: (1) Rheumafactor Latex test; (2) the Waaler-Rose test; (3) passive hemagglutination with tanned O-rh RBC which were loaded with Cohn's Fractions II, both species-specific and species-unspecific; (4) the inhibition test; (5) column chromatography on Sephadex G 200; the separated entities were tested for antibody and antigen reactions. Considering all the tests applied and the care exercised in back checking, the comparison of factors with factors previously known, and the use of immunologic cross reactions, the results were uneven and were summarized: (1) Rheuma factor-like entities with anti-γ-globulin properties arose irregularly in the course of the liver diseases studied. After inactivation of sera in the Latex test, they were no longer demonstrable. The Waaler-Rose test was generally negative. The factors reacted the strongest with aggregated human γ-globulin A heat-labile fraction was destroyed at 56°C. (2) Rheuma factor-like entities arising in the sera of patients with these liver diseases were not identical with other antibodies arising during liver disease. (3) The factors were not single entities and showed a different spectrum of immunologic cross-reactions with species nonspecific γ-globulins. A complete inhibition of the reaction with human γ-globulins did not occur under the varying conditions employed.

9453 LUPOID HEPATITIS: COMPUTER ANALYSIS DEFINING "HEPATITIS" AND "CIRRHOSIS" PHASES AND RELATIONSHIPS BETWEEN HEPATOCELLULAR DAMAGE AND IMMUNE REACTIONS IN THE LIVER. (E.) Goldstein, G. (Roy. Melbourne Hosp., Australia) and I. R. Mackay. Aust. Ann. Med. 16(1):62-69, 1967.

The interrelationships between histopathological, clinical, biochemical and serological indices in 30 patients with lupoid hepatitis were analyzed by a digital computer which was used to calculate 225 correlation coefficients. The study defined 2 groups of significantly interrelated histological indices corresponding to "hepatitis" and "cirrhosis" phases of the disease. The hepatitis phase comprised liver cell necrosis, plasma cell accumulation and Küpffer cell hyperplasia; the cirrhosis phase comprised loss of architecture, bile duct proliferation, fibrosis, and lymphocyte and plasma cell accumulation. The study also defined significant interrelationships in the hepatitis phase between hepatocellular damage and an immune reaction as shown by plasma cell accumulation in the liver, lupus erythematosus cell positivity and γ-globulin increase in serum. At least in part, the immune reaction is to antigens of damaged hepatic cells; it may be entirely a consequence of damage from a primary process, such as a virus infection, or it may be an autoimmune cause of continuing cell injury. The analysis did not discriminate between these 2 possibilities.

9454 HEPATIC PUNCTURE BIOPSY GUIDED BY SCINTISCANNING WITH COLLOIDAL ^{198}Au. (It.) Bazzanella, F. (U. Perugia, Italy), U. Senin and R. Palumbo. Settimana Med. 54(21):1155-1162, 1966.

Patients with suspected primary or metastatic liver malignancy (based on routine liver function tests and objective examination) were subjected to liver scintiscanning by i.v. inj. of 250 µc of colloidal ^{198}Au. In 10 patients, "cold" areas were delimited on the skin of the hepatic region by means of dermatographic pencil, guided directly by the scanning procedure. In the patients in whom no "cold" areas were evident, needle-puncture biopsy of the liver was performed at the level of the VIII-IX intercostal space according to Menghini's method. In the 10 patients who presented "cold" areas, needle-puncture biopsy was performed at the level of the areas delimited on the skin of the hepatic region. In all of these patients, biopsy revealed the presence of neoplastic tissue. Histologic examination confirmed the presence of carcinoma (4), metastatic carcinoma (4), metastatic sarcoma (1), and metastatic seminoma (1). Two patients are described in detail. The constant positivity of results obtained with this method, as well as the simplicity of the procedure, have prompted the authors to recommend its routine use in all clinical cases in which liver malignancy is suspected.

9455 LIVER SUBSTITUTION THROUGH HOMOLOGOUS AND HETEROLOGOUS EXTRACORPOREAL LIVER PERFUSION. (Ger.) Boeckl, O. (Regional Hosp., Salzburg, Austria), E. Hell and G. Zimmermann. Z. Ges. Exp. Med. 143(3-4):362-366, 1967.

The excised liver of hogs was placed in a perfusion apparatus with blood from another hog (homologous perfusion); the apparatus maintaine proper temperature, and oxygenated the blood; acidosis was corrected with 10% NaHCO$_3$ soln., and alkalosis with lysine soln. The afferent vessel was the portal vein and the efferent, th vena cava. The portal pressure was 22-65 mm Hg and the min. vol. 380-670 ml (0.5-0.8 ml/g/live min.). The perfusion lasted 3 hr. usually; some prolonged perfusions were done. Heterolog perfusion was carried out in exactly the same manner after the hog blood had been washed out from the liver by physiological saline cooled t 4°C. The perfusion apparatus was filled with human blood from the blood bank. The parameter tested for comparison between the homologous an heterologous perfusions were, O_2 consumption, bile flow, plasma hemoglobin, LDH, SGPT, BSP clearance and ^{131}I-rose bengal clearance. O_2 consumption in the homologous perfusions was about twice that in the heterologous perfusions total bile vol. in homologous perfusion was 2.4 times that in heterologous perfusion after 3 hr Hemolysis was 8 times greater in the heterologo perfusions, SGPT increased 2.5 times and LDH 1. times. BSP clearance was equally poor, amounti to only 40% in 120 min. ^{131}I-Rose bengal clearance in the homologous perfusions at the end of 3 hr. was 2.67 times that in the heterol ogous perfusions. Although function is maintained in hog liver with heterologous perfusion the activity of the parameters studied is generally less for normal and more for abnormal functions.

9456 UMBILICO-PORTOGRAPHY. (Fr.) Kapandj M. (Hotel-Dieu, Paris). Sem. Hop. Paris 43(23):1548-1559, 1967.

After reviewing the technic, literature, and personal experience with regard to the Carbalha method of portography through the umbilical vei the author describes his modifications in which intrahepatic portography by the umbilical vein was performed surgically by inj. of contrast medium into the round ligament of the liver (approx. 15 cases) or nonsurgically during laparoscopy (48 cases). Several illustrative cases are described. With the surgical method of inj. into the round ligament, visualization of the left paramedial vein and its branches in Segments III and IV was possible in the first attempt, while dilatation of the left lateral vein in Segment II and venous abnormalities in Segments IV, V, and VIII were observed in another case. The nonsurgical method combined laparoscopy (which permitted visualization and photography of the liver and other organs of th abdominal cavity) with portography through the

ɔilical vein. This method has also shown that
eumoperitoneum increases the visibility of the
und ligament and the intrahepatic portal
essure without affecting the suprahepatic veins.
:h this method, the author was able to observe
lecrease in portal vein pressure and an increase
the caliber and number of ramifications of
intrahepatic veins following direct portal
. of procaine, and other local anesthetics or
odilators. A diagnosis of Cruveilhier-
ımgarten syndrome was possible with this method
a 52-yr.-old man with enlarged liver and
btful liver function test response. In 2 male
ients (59 and 36 yr. old) with metastatic
cer of the liver, an unusual syndrome consist-
of an association of intrahepatic portal
ertension and numerous anastomoses between
portal and hepatic veins was observed with
s method. The author believes that his method
portography through the umbilical vein, non-
gical and performed under local anesthesia,
sents many advantages.

7 DETERMINATION OF SERUM ORNITHINE-
CARBAMYL-TRANSFERASE BY MICROTITRIMETRY.
.) Counitchansky-Cille, Y., J. F. Bolot and
Creyssel. Rev. Franc. Etud. Clin. Biol. 12(3):
-300, 1967.

test developed by the authors made use of 3
parations: (1) 1 ml of serum was mixed with
l of citruline substrate soln.; (2) 1 ml of
um was mixed with 1 ml of arseniate buffer; (3)
l of citrulline substrate soln. was mixed with
l of arseniate buffer. These preparations
e incubated at 37°C for 24 hr., after which
y were centrifuged. Aliquots of the clear
ernatants were placed in Conway diffusion
ls following incubation for 1 hr. with
chloric acid at 37°C. Ammonia was displaced
an alkaline reagent and trapped in 2 x 10^{-4}
onium chloride which was then back-titrated
ng a Conway microburet. The ammonia liberated
m Preparation 2, the serum blank and from
paration 3, the citrulline blank was sub-
cted from the total ammonia in Preparation 1
lding the ammonia released by the enzyme.
ivity was reported as µg of ammonia nitrogen
0.5 ml of serum. Tests done on the sera of
normal gave a value of 0.019 µg of ammonia
rogen for 0.5 ml of serum. All tests were
e in duplicate. Reproducibility and sensi-
ity of the method were high.

8 SULFOBROMOPHTHALEIN BLOOD CLEARANCE
TEST. PROBLEMS OF INTERPRETATION AND
THER MEANS OF EXPRESSING RESULTS. (Fr.)
let, J. (U. Paris, France) and G. Albot.
h. Franc. Mal. Appar. Dig. 55(11):999-1014,
6.

clearance was studied in a patient with stones
the bile duct. The amount of dye present in
serum at zero time of the test was 100 mg/liter
um; samples of serum were obtained at 8, 15,
75, 90 and 120 min. When plotted, the curve
ibited 2 slopes. During the first 20 min., dye conc. decreased 55 mg/liter of serum or at the av. rate of 2.75 mg/liter of serum/min. In the next 100 min. the dye conc. fell 18 mg/liter of serum, or at the av. rate of 0.18 mg/liter of serum/min. or only about 7% of the former rate. In the first 20-min. period 2.75 mg of dye were removed from the serum/min. representing all the dye in 27.50 ml of serum; therefore the clearance of BSP in this period was 27.5 ml/min. Similarly the clearance in the second period was 1.8 ml of serum/min. The relationships of these 2 slopes, P_1 and P_2, to each other are considered to yield information as to the type of hepatic disease suffered by the patient. After a number of manipulations of the graphs the authors obtained the natural logarithms of P_1 and P_2. At this point it was stated that P_1 and P_2 were already common logarithms and in order to convert to natural logarithms, these were multiplied by the factor 2.3. The value given for P_2 was 0.0013 (the common logarithm of the number 0.997); 0.0013 multiplied by 2.3 equals 0.003 or 0.3/100, designated as K_2 and called a "clearance." With values for K_1 on the ordinate and K_2 on the abscissa of a graph having areas allotted to specific liver disorders, it is believed possible to diagnose a liver defect by the area in which the intercept falls. This diagram, marked with very definite diagnostic zones, is termed the correlation diagram.

9459 SERUM AND BILIARY METABOLITES OF B.S.P. IN RELATION TO THE CURVE OF DECREMENT OF SERUM B.S.P. IN NORMAL SUBJECTS AND SUBJECTS WITH HEPATOBILIARY DISORDERS. (It.) Molino, G. P. (U. Turin, Italy), A. Cravario and E. Giangrandi. Fegato 12(4):409-432, 1966.

In the course of retention and clearance tests employing 5% tetrasulfobromophthalein (5 mg/kg single i.p. dose with blood samples derived 3, 6, 10, 30 and 60 min. after inj.), the non-metabolized dye and 1-3 "slower" serum fractions were separated by chromatography on silica gel. No "slower" fractions were demonstrable at any time in the sera of 5 healthy subjects or in that of a patient with thalassemia. However, such "slower" serum fractions of BSP were found within 10-15 min. (i.e., at the time when the rate of serum decrement of total BSP changes abruptly) in 8 of 9 patients with hepatic cirrhosis, 2 of 2 with acute viral hepatitis, 0 of 3 with viral hepatitis in a stage of regression, 3 of 3 with cholecystitis, 2 of 3 with hemochromatosis, 2 of 2 with obstructive jaundice and 1 of 1 with hemolytic jaundice. They were also demonstrable, after approx. 30 min., in the bile of 2 patients who had undergone cholecystectomy and Kehr drainage a few days before the test was admin. When human serum was incubated for 12-50 hr. with a 0.1% soln. BSP in distilled water (0.1 ml/ml serum), slow fractions were demonstrable in the serum of 2 of 4 healthy subjects, 2 of 2 with acute viral hepatitis, 1 of 2 with viral hepatitis in a state of regression, 7 of 8 with cirrhosis of the liver, 2 of 2 with cholangitis, 1 of 2 with obstructive jaundice secondary to pancreatic cancer and 1 case, each, of cholecystic empyema and cholelithiasis. They were also demonstrable in the sera of 2 patients with apparently normal liver function (1 with thrombosis of the splenic vein, 1 with myocardial infarct) but not in that of 10 other patients with apparently normal liver function in the presence of a wide range of other disorders. They were also demonstrable when BSP was incubated with homogenates of rat liver, kidney or muscle tissue at 37°C, but not when incubation was carried out at room temperature or at -20°C.

9460 HEPATIC CLEARANCE OF B.S.P. ADMINISTERED IN SMALL DOSES TO SUBJECTS WITH HEPATO-BILIARY DISEASES.

(It.) Cravario, A. (U. Turin, Italy), G. Molino and E. Giangrandi. Minerva Gastroent. 12(4):135-141, 1966.

A modified BSP-retention test is described in which 20 mg tetra-BSP was inj. i.v., prior to taking blood samples at 2-min. intervals from the third to the eleventh min., inclusive. Among 20 healthy, adult subjects (10 men, 10 women), the median clearance value (ml/min./kg) was 10.7±1.1 (range = 9.0-13.7); among 10 patients with decompensated Laennec's cirrhosis of the liver, it was 2.5±1.0 (range = 1.3-4.4); among 9 with the same disorder in compensated form, it was 4.3±1.2 (range = 1.9-6.1); among 4 with primary biliary cirrhosis, it was 4.8 (range = 1.1-9.0); among 9 with acute viral hepatitis, it was 3.1±1.0 (range = 1.9-4.5); among 11 with viral hepatitis in the recovery stage, it was 7.4±1.6 (range = 4.8-10.2); among 9 with occlusive jaundice, it was 3.66 (range = 0.8-8.5); among 6 with hemolytic jaundice, it was 14.5±1.5 (range = 11.1-19.5). Among 2 patients with essential splenomegaly, it was 19.0 and 17.4, resp., but fell within essentially normal limits among 6 in whom splenomegaly was secondary to systemic malignancy or thrombophlebitis. In a patient with Rotor's jaundice, it was extremely low (1.7), as it was in a patient with constrictive pericarditis prior to surgery (2.8, as compared to 6.7 after pericardiectomy). Relatively low values (4.7-6.9) were also seen in 2 patients with cardiac decompensation, 1 with myeloma + hepatomegaly and 1 with incipient hemochromatosis. It is concluded that the method is more sensitive than the conventional one, and offers more accurate evaluation of functional liver damage, depending as it does on the factor of hepatic flow. The logarithmic methods employed for calculating both the clearance fraction and the plasma clearance values referred to above are detailed at length.

9461 STANDARDIZATION OF THE BROMSULPHALEIN TEST WITH RESPECT TO BODY COMPOSITION.

(E.) Brohult, J. (Danderyds Hosp., Sweden). Scand. J. Clin. Lab. Invest. 19(1):67-71, 1967.

A procedure is described for calculating the dose of BSP so that the quantity admin. gives an initial level with a narrower spread than when the dose is given per kg body wt.; the procedure involves dosage in relation to the fat-free soft tissue, estimated by an anthropometric method. Two groups of chronic alcoholics consisting of 29 men each were studied; the subjects were fasted overnight. In the first group, BSP doses were related to body wt. (5 mg/kg) and in the second they were related to the estimated wt. of the fat-free soft tissue, the amount inj. calculated from the formula $C\cdot(0.8\,L + \frac{W-L}{3})$ mg, where L is the lean body mass in kg and the coefficient 0.8 is derived from the fact that bone comprises 20% of this; lean body mass was calculated according to an anthropometric method. W is the body wt. in kg, so that W-L is the adipose tissue; this expression is divided by 3, since the fat-free part of the adipose tissue (cell residue and extracellular water) amounts to approx. one-third. The constant C in the formula was set at 7, since this value empirically gave the same av. zero-time conc. for both dosing methods. In addition, both methods were performed on a group of normal subjects (15 men, 17 women). Both groups (normals and alcoholics) showed a significantly narrower spread of the initial values when the dose was calculated from the estimated wt. of the fat-free soft tissue. The usefulness of this new procedure in clinical practice is discussed.

9462 A COMPARATIVE STUDY OF JIRGL'S TEST, ILCA'S TEST AND SIDEREMIA IN A GROUP OF JAUNDICED PATIENTS.

(It.) Nuti, M. (U. Rome) G. C. Leoni and E. Messeri. Minerva Med. 58(18) 692-696, 1967.

Jirgl's Test, said to be positive only in the presence of cholestasis, with the intensity of the reaction directly proportional to the degree of obstruction, is also said to depend on the presence of an abnormal serum mucoprotein reacting with KOH and then, successively, with sulfosalicylic acid, phosphotungstic acid in HCl and anhydrous sodium carbonate with Folin-Ciocalteau's reagent. Ilca's Test, which depends on the degree of turbidity resulting from saturation of serum transferrin with a soln. of ferric citrate and ammonia, is said to yield positive reactions directly proportional to the degree of hepatic damage, but remains negative in the presence of cholestasis, as such. Among 36 patients with viral hepatitis, Ilca's Test was positive in 94.4%, Jirgl's Test was negative in 91.6%. Among 20 with cholestatic jaundice, Ilca was negative in 76.9%, Jirgl was positive in 57.6%. Among 65 with cirrhosis of the liver and 16 with chronic hepatitis, Ilca was positive and Jirgl was negative in all cases. Ilca was positive and Jirgl was negative in 10 of 15 cases of hepatic cancer; both were positive in 3 of 15; Jirgl was positive and Ilca was negative in 1 of 15; both were negative in 1 of 15. Ilca was negative and Jirgl was positive in 4 of 14 cases of cholangitis; Ilca was positive and Jirgl was negative in 4 of 14; both were

e in 2 of 14; both were negative in 4 of
e percentage of false positive or false
e responses yielded by Ilca was tabulated
otal of 8 cases of prehepatic, 61 of
and 26 of posthepatic jaundice as 0%,
d 23%, resp. Comparable tabulations for
re 0%, 4.9% and 42.3%, resp. In all
of patients, determinations of sideremia
results which were too variable to aid
erential diagnosis.

JIRGL'S TEST FOR THE DIFFERENTIAL
DIAGNOSIS OF JAUNDICE. (Ger.) Zach,
y Hosp., Cologne-Merheim, Germany), K.
ann and J. Hemelt. Gastroenterologia
106(6):313-324, 1966.

iations encountered in the Jirgl serum
r the differential diagnosis of jaundice
d a re-examination using his method.
in and seromucoid values were determined
llel. The reagents for the Jirgl test
epared with special care and the test
ly performed. This was also true for the
nation of seromucoids which are essential
Jirgl test; seromucoids were determined
ometry. Bilirubin in serum was measured
Jendrassik method. Additional tests were
ata, Weltmann coagulation band, thymol
tion, alkaline phosphatase, SGOT, SGPT,
. The investigations were carried out on
ents; 21 of whom had obstructive jaundice
tumor or stone; 38 had jaundice of other
and 26 had different disorders without
e. Of 21 patients with obstructive jaun-
6 (76.2%) were positive according to the
est and 5 (23.8%) were negative. Of the
8 with various forms of jaundice, 27
were negative and 11 cases showed a
e Jirgl reaction. The 26 nonjaundice
ere all negative. Bile of 4 additional
s obtained during or shortly after
on proved to be negative. Analyses of
ositive and false negative cases led to
tative conclusion that the Jirgl test is
y based upon a mechanical closure of the
ducts but can become positive when there
ntrahepatic cholestasis. According to
own accounts the test is not dependent
e mechanical obstruction of the biliary
ways only. The mechanism of the reaction
l unknown. It has been suggested that in
asis a physiologically active substance
ased into the blood; such a substance has
n found in man. In the investigations
d in this paper, the bile always was
e when the serum was positive. If this
est is negative an obstruction is most
y but a positive result does not
ntiate extrahepatic from intrahepatic
asis. The seromucoid conc. and the test
showed a poor correlation.

FATTY ACID COMPOSITION OF HUMAN HEPATIC
TISSUE IN MECHANICAL JAUNDICE. (It.)
Salvioli, G. (U. Modena, Italy), L. Marani, G. Vecchi and P. Ferrari. Fegato 12(4):468-477, 1966.

Fatty acid composition was determined by gas chromatography separation of lipid fractions of hepatic tissue in 5 normal subjects (3 women and 2 men; age 25-71 yr.) and 4 patients (3 women and 1 man; age 57-75 yr.) with mechanical jaundice due to gallbladder cancer (1) or gallstones (3). Cholesterol ester separation revealed an increased ratio of short chain fatty acids in jaundiced patients, with a decrease in oleic acid (av. 34.5%) as compared to normal subjects (av. 39.02%). Triglyceride separation revealed a decrease in arachidonic (av. 1.63%; normal av. 5.41%) and linoleic (av. 16.14%; normal av. 21.28%) acids along with an increase in saturated (av. 25.27%; normal av. 21.3%) and monounsaturated (av. 35.66%; normal av. 33.67%) acids. Phospholipid separation revealed a decrease in saturated acids (av. 19.1 and 18.45%; normal av. 22.64 and 19.97%) and a slight increase in oleic acid (av. 17.85%; normal av. 14.64%). Results are difficult to evaluate in view of the changes in fatty acid composition caused by disturbances of intestinal absorption and bile excretion as well as concomitant lesions of the hepatic parenchyma. In general, a decrease in oleic acid among hepatic cholesterol esters indicates defective cholesterol absorption, whereas a decrease in the amount of linoleic and arachidonic acids indicates hepatocellular damage.

9465 HISTOCHEMICAL, CHEMICAL AND SPECTROGRAPHIC STUDY OF HEPATIC PIGMENT IN DUBIN-JOHNSON DISEASE. (Fr.) Chevrel, M. L., B. Ferrand, J. Kerisit and L. Kerisit. Arch. Anat. Path. (Paris) 14(4):260-263, 1966.

Preliminary histochemical studies of intrahepatic pigment obtained from 4 patients with Dubin-Johnson's disease failed to establish a melanic nature of the pigment, although this was strongly suspected because its reaction to the Gomori, Lillie, and Hueck stains and to oxidizing agents differed from that of lipofuscin. A powder was then extracted from 60 g of hepatic tissue obtained at autopsy and freeze-dried according to the Wegman-Rangier technic. Microanalytic studies of the powder were then undertaken and the percentages of C, H, and N were similar to those obtained with a powder prepared from bovine eye; the H content was slightly higher than that reported by Nicolaus (using melanin obtained from melanomas) but other values agreed with those of Masuda (using urinary pigment from patients with Dubin-Johnson's disease). Infrared spectrum studies of the powder showed typical OH or NH group absorption around 3 microns, carbonyl group absorption around 6 microns, and an absorption band around 1625 cm^{-1}. These results are similar to those obtained with melanin obtained from bovine eye and to those reported by other authors. Findings, therefore, seem to indicate that the intrahepatic pigment obtained from patients with Dubin-Johnson's disease belongs to the melanins.

9466 RECURRENT JAUNDICE IN PREGNANCY. II. A STUDY OF THE ESTROGENS AND THEIR CONJUGATION IN LATE PREGNANCY. (E.) Adlercreutz, H. (U. Helsinki Meilahti Hosp.), A. Svanborg and Å. Ånberg. *Amer. J. Med.* 42(3):341-347, 1967.

In 7 women (22-30 yr. old) with recurrent jaundice of pregnancy, urine samples for hormone analysis were taken on 17 occasions during the last trimester, when jaundice was present for at least 2 wk. Simultaneous sample of urine, blood and bile were taken in 1 (23 yr.) who had recurrent jaundice during 4 successive pregnancies. Results were compared with 16 urinalyses from 11, 7 blood analyses from 7, and 10 bile analyses from 10 healthy pregnant women. For blood analysis, 30-50 ml was withdrawn from the antecubital vein; for bile analysis, 30-50 ml by duodenal intubation (Adlercreutz). The following were measured: estriol, estrone, estradiol-17B in urine; these 3 in sulfate and glucosiduronate fractions of bile and blood; 3-monosulfates of the 3 in urine. Conjugation patterns of estrogens were studied by dividing conjugates into 2 groups by Sephadex 25 gel filtration (peaks, I, II of Beling). Urinary excretion of the 3 was normal during the jaundice phase. In these patients, 17B-estradiol-3-sulfate was decreased, estriol-3-sulfate increased. There was a shift from Peak I to Peak II conjugates following gel filtration of urine samples. Peak II conjugates contained significantly more of 1 or several unknown polar estrogens other than estriol. In the patient studied for urine, blood and bile, estrogen conc. in all 3 was decreased. The proportion of 3-monosulfates was higher than in normals. These observed significant changes in estrogen metabolism are thought to be secondary to jaundice and impaired enterohepatic circulation of estrogens, and not a primary defect bearing a causal relationship to the liver disease.

9467 THE MECHANISMS OF IDIOPATHIC CHRONIC JAUNDICE. (Fr.) Magnenat, P. (U. Lausanne, Switzerland), F. Minio and A. Gautier. *Bull. Soc. Med. Hop. Paris* 118(1):65-74, 1967.

Six cases of Gilbert's, 5 Dubin-Johnson's, and 2 Rotor's syndrome; all were studied by electron microscopy as was Criglar-Najjar's. Distinguishing features, sufficient to differentiate the 4 forms, were found. The disorder described by Israels is very rare; the principal anomaly is the formation of bilirubin by precursors of hemoglobin, proved by radioactive glycine which appears in fecal stercobilinogen without incorporation in the hemoglobin of RBC. The Criglar-Najjar disorder is marked by neonatal jaundice, often accompanied by severe encephalopathy, due to a hereditary deficiency of glucuronyl-transferase activity and, therefore, of glucuroconjugation of bilirubin; defective glucuroconjugation is proved by the urinary excretion of such substances as unconjugated menthol and *in vitro* by the biochemistry of biopsy tissue. Gilbert's jaundice is distinguished by a parti deficiency of glucuronyl-transferase activity and a defective retention of bilirubin in the hepatocytes. The Dubin-Johnson syndrome shows retention of a pigment of unknown composition (lipochrome?) with a persistent hyperbilirubin and a normal glucuro-conjugation. Rotor's jaundice is positive for the direct Van den Be reaction; there is an absence of pigment in th liver cells; and a tendency to opacity of the biliary ducts. Five different characteristics appear in different combinations in 4 of these forms of jaundice under the electron microscop (1) lesions of the vascular pole, (2) pigment inclusions, (3) tendency for fibrillar degener tion of mitochondria, (4) tendency for vascula degeneration of mitochondria, (5) biliary stas within hepatocytes. Criglar-Najjar's jaundice has (1) and (5). Gilbert's has (1), (2), and (3). Dubin-Johnson's, (1),(2),(3),(4) and (5) and Rotor's (1),(2),(3), and (5).

9468 PHYSIOPATHOLOGY OF JAUNDICE OF FATTY LIVER. (Fr.) Pavel, I. (Nutr. Clin Bucharest), S. Câmpeanu, N. Ş. Chisiu, H. Bonaparte, A. Petrovici and M. Stoian. *Rev. Roum. Med. Intern.* 4(1):27-34, 1967.

Three cases of fatty liver were studied clinically, by means of function tests, and by ultramicroscopy; the cases were of different grade, with a diabetic background but without any other known etiologic factor; 1 patient ha lipotrophic diabetes; the fatty liver depositi was mild in 1, medium in another and massive i the third. All presented a clinical picture o isolated, enlarged liver. Serum protein chang approaching the extreme limits of the normal range occurred in the first 2. The BSP test was 6 and 9.2% in the first 2; clearance of endogenous bilirubin was +35% and +30% (normal +45%). These tests were not applied to the third patient because of extreme lipemia. Jaundice appeared in the third case as a resul of admin. of an anabolic steroid. Jaundice lasted for several days after cessation of tre ment. The chief ultramicroscopic changes from normal were: (1) Thickening of the cell membrane, dilatation of the bile canaliculi in certain zones; reduction in number of microvil in some regions. (2) Numerous cytoplasmic vacuoles, some filled with lipid material and some finely granular (glycogen); ribosomes wer present at the outer edge of these vacuoles. (3) Mitochondria appeared normal but some show ballooning with destruction of cristae. (4) Nuclei appeared normal. (5) The sinusoids wer full of osmophilic granular material and debri of cellular organelles; apparently the massive amounts of lipids on their way to the blood caused extensive cellular damage. In over 30 cases of fatty liver no spontaneous case of

e has been noted. Fatty liver induced in
bit by feeding 12-15 g of vegetable oil
terial rich in cholesterol and inorganic
d in a fatal jaundice. Laboratory tests
peded. Some details were different but,
main, the same general picture emerged
e ultramicroscopic examination. The
e produced in the rabbit may arise from
g of biliary passageways, and/or massive
tion of hepatocytes.

CATECHOLAMINE LEVELS IN PORTAL, HEPATIC,
AND SYSTEMIC VENOUS BLOOD IN PORTAL
NSION. (E.) Joly, J. G. (U. Montreal,
, J. Leduc, J. Bernier, P. Lavoie and
let. Lancet 2(7507):121-123, 1967.

patients in this study were divided into
s. Group 1 was composed of 11 patients
postsinusoidal type of portal hypertension;
irrhosis, 7 of which were alcoholic
is and 2 cirrhosis of unknown etiology; 1
had gastric carcinoma with extrahepatic
obstruction without liver metastases, and
etastatic growth in the liver. Group 2
ed of 5 patients without portal hyper-
; 3 had healed alcoholic hepatitis, 1 had
artery thrombosis with liver infarcts
ad chronic relapsing pancreatitis. Com-
epatic and umbilicoportal venous catheteri-
was used to sample blood in the vena cava,
atic vein and the portal vein; catechol-
evels were determined by means of a
etric method. No difference in epinephrine
epinephrine plasma levels was found in
roups. Mean portal venous plasma levels
pinephrine were higher than mean hepatic
plasma levels, suggesting that the liver
izes circulating norepinephrine. It is
ed that catecholamine plasma levels have
ing on portal hypertension.

DYNAMIC OBSERVATION OF THE PORTAL
CIRCULATION PRIOR TO AND AFTER OMENTO-
IAPHRAGMOPEXY IN PATIENTS WITH PORTAL
NSION. (Rus.) Ender, L. A. (Moscow Reg.
s. Clin. Inst.). Vestn. Khir. Grekov.
3-20, 1967.

atients with liver cirrhosis and intra-
blockade of portal circulation after
epatodiaphragmopexy, 10 had high (390-420
and 16 low-moderate (220-380 mm) portal
nsion. Of 10 with high portal hyper-
, 7 died immediately or within 1.5 yr.
urgery, while 1 of 2 who remained alive
fuse hemorrhage 14 mo. after surgery and
operated on. Only 1 patient had no
age at any time; when observed 5 yr. and
ater, the intrasplenic pressure was
ed (from 400-520 mm) and the spleen was
y enlarged. Within 1.5 yr. the other
s developed irreversible decompensation
portal circulation and died from profuse
ogastric hemorrhages. Two of 16 with low-moderate portal hypertension died within one yr. after surgery (1 from hemorrhage, 1 from hepatic insufficiency), while 14 were observed, because of the need for repeat surgery, for 8 mo.-5 yr., 2 mo. after surgery. Increase of intrasplenic pressure from 40-340 mm was observed in 11, being max. in those patients with low portal hypertension. The development of natural portacaval anastomoses after surgery was noted in 5 subjects, and significant splenomegaly developed in 9; 5 patients with low-moderate portal hypertension developed ascites immediately after surgery, while 6 developed esophageal-gastric hemorrhages at various times after operation. After surgery the portal circulation improved in only 1 of 26. Thus, the majority of patients had exacerbation of the portal circulation and an increase of portal pressure after omentohepatopexy. In patients with portal hypertension who were not treated surgically, the intrasplenic pressure exhibited no changes. A comparative study of splenoportogram before and after omentodiaphragmopexy, studied in 16 patients, showed changes upon second observation in 8 cases; an increased number and diameter of collaterals was found in 7, impaired intrahepatic vascular diagram in 5, and increase of the diameter of the portal vein in 2, and thrombosis of the portal vein in 2 patients with low portal hypertension. Two case histories are presented in some detail.

9471 SIGNIFICANCE OF RADIOMETRIC METHOD OF STUDY OF CARDIOPORTAL BLOOD CIRCULATION IN PATIENTS WITH CHRONIC DISEASES OF THE LIVER. (Rus.) Bondar, Z. A. (First Moscow Sechenov Med. Inst.) and T. F. Novikova. Klin. Med. (Moskva) 45(3):26-32, 1967.

The method consisted of i.v. admin. of ^{131}I-labeled albumin (0.3 μc/kg) into the cubital vein and blockade of the thyroid gland for 3 days with a 3% soln. of KI. This study was performed on 47 patients (38 men, 9 women; 19-65 yr. old) with chronic diffuse diseases of the liver. The time of cardioportal blood circulation in portal, postnecrotic or biliary liver cirrhosis (30) was 41.2, 42.5 and 36.5 sec.; in chronic hepatitis (9) it was 29.6 sec.; in fatty liver (4), 24.8 sec.; in benign hyper-bilirubinemia (4), 25.5 sec.; and in healthy normals it fluctuated between 19-30 sec. There was a significant difference in the indices of vascularization in patients with liver cirrhosis (av. 940 impulses/sec.) and chronic hepatitis (av. 1014 impulses/sec.). Blood clearance was significantly delayed in patients with liver cirrhosis. Cardioportal circulation time was increased in 11 of 12 patients with ascites and collateral blood circulation; in all patients with cirrhosis and splenomegaly, the cardioportal circulation time was delayed in proportion to the degree of splenomegaly. In 6 patients with cirrhosis but no portal hypertension, the cardioportal circulation time was prolonged (33-52 sec.); this is of diagnostic significance. A direct relationship between the level of intrasplenic pressure and cardioportal circulation time was noted. Thus, the radioisotope method of determination of cardioportal circulation time could be used both for diagnosis of pronounced portal hypertension and study of its initial forms. In 11 patients in the active stage of hepatic cirrhosis and in 15 patients with the inactive stage of cirrhosis, the cardioportal circulation time was 45 and 37.6 sec., resp. Therefore, a delay in the cardioportal circulation with a corresponding clinical picture can be indicative of exacerbation of the pathological process. In 2 patients with chronic hepatitis, unchanged liver function tests, increased weakness, subcostal pain and liver pain upon palpation, the cardioportal circulation time was prolonged (44 and 45 sec., resp.). Thus, hemodynamic disturbances of hepatoportal blood circulation are one of the early symptoms diagnostic of the active process of chronic hepatitis and liver cirrhosis.

9472 STUDY OF BIOGENIC AMINE TITER IN PORTAL HYPERTENSION IN EXPERIMENTAL AND CLINICAL CONDITIONS. (Rus.) Gorbatenko, V. P. (State Therap. Clin., Cent. Res. Lab., Moscow), A. S. Chechulin, V. V. Menshikov, T. D. Bolshakova, L. S. Bassalik and T. I. Lukicheva. Ter. Arkh. 39(1):66-72, 1967.

Portal hypertension was induced by incomplete ligation of the portal vein in 5 completely-operated dogs, with s.c. exposure of the spleen. After ligation of the portal vein (25% of the lumen remained open), the pressure (in mm H_2O) increased from 65-90 to 140-180. During portal hypertension the amount of pressor amines (serotonin, catecholamines and their metabolites and 5-hydroxyindole acetic acid) and their metabolites increased. Three dogs which had repeated surgery at the end of the chronic experiment (3-7 mo. of observation) exhibited an even greater increase in pressure (218-300 mm H_2O) than after their initial operation. The admin. of serotonin (0.1 mg/kg), epinephrine (1 ml of 0.1% soln.) and norepinephrine (1 ml of 0.2% soln.) into the portal vein produced an increase in pressure, even after the use of depressants; pressure with serotonin did not reach the initial level, but pressures with the remaining 2 agents exceeded the initial level. Pressor action was brief; it was highest with norepinephrine and lowest with serotonin. Reserpine also displayed depressant action after admin. of pressor amines. A clinical study made on 9 patients with chronic hepatitis and 19 with liver cirrhosis (compensated in 5, decompensated in 14, ascites in 5, chronic portal vein thrombosis in 3, gastrointestinal hemorrhage in 5, liver insufficiency in 11, exacerbation of hepatitis or cholangitis in 10) revealed a tendency toward an increase in the content of pressor amines and their metabolites. In 20 of 28 patients intrasplenic pressure (measured by splenoportography with splenomanometry) av. 73.3 mm in chronic hepatitis, 302 and 374.5 mm, resp., in compensated and decompensated cirrhosis. Blood serotonin, determined by a biological method, and the daily content of catecholamines and metabolites of pressor amin in the urine, showed a tendency to increase in the patients with chronic hepatitis and liver cirrhosis, especially in the case of decompens cirrhosis. The excretion of vanillyl-amygdali homovanillic and 5-hydroxyindole acetic acid w increased in patients, especially those with h titis. The content of pressor amines was chang more sharply than that of their metabolites. possibility of an aggravating action of presso amines on the course of hepatic cirrhosis is n excluded. The rapid and increased pressor eff by periodic accumulation in the portal bed, to er with other factors, could cause hemorrhage collateral circulation. Arterial hypertension angina pectoris apparently developed under the action of biogenic amines in those patients wi liver cirrhosis.

9473 REGULATION OF THE BLOOD AND INSULIN- LEVELS OF HUMAN SERUM BEFORE AND AFT PORTACAVAL SHUNT. (Fr.) Azerad, E. (Beaujon Hosp., Clichy, France), J. Lubetzki, J. Duprey and D. Friedler. Diabete 15(1):50-56, 1967.

Subjects (10 men and 10 women) with portal hypertension were studied with respect to gluc tolerance and glucose metabolism before and after portacaval anastomosis; none had a histo of diabetes; 18 underwent a portacaval end-to- anastomosis, 1 a splenorenal anastomosis, and a portacaval side-to-side anastomosis; 15 had alcoholic cirrhosis, 4 cirrhosis of unknown origin and 1 congenital liver fibrosis; the ag span was from 23 yr. (congenital fibrosis of t liver) to 69 yr. (alcoholic cirrhosis). The first test was given 1-18 days before and the second test 8-19 days after the operation; the dosages varied somewhat depending upon the met of analysis (reduction or enzymatic) but were the range of 0.33 g/kg body wt. in the form of a 50% soln. of glucose inj. i.v. The coeffici of glucose assimilation (K) varied for the 20 patients between 0.75×10^{-2} and 2.94×10^{-2}. Coefficients where K is greater than 1.30 x 1 are considered normal and where K is less than 1.00×10^{-2} the coefficients indicate diabetic types; intermediate values for K are of doubtf significance. Before operation the range for the patients was 0.75×10^{-2} and 2.94×10^{-2}; within normal limits, 10 were of diabetic type and 4 were doubtful. After operation the rang was from 0.48×10^{-2} to 3.54×10^{-2}; 5 were in normal range, 6 of diabetic type and 9 doubtfu Blood insulin conc. was measured in 12 subject before and after operation: the range before from 2-110 µU/ml with an av. of 23 µU/ml and f 0-50 with an av. of 20 µU/ml. As the surgical procedure did not significantly alter the resu of the preoperative tests, the new hemodynamic conditions did not determine the onset of post shunt diabetes which has been reported by othe Different physiological mechanisms may explain these facts.

VENOUS THROMBOSIS AND MANOMETRIC
STUDIES IN PORTAL HYPERTENSION DUE TO
EPATIC BLOCKADE. (Fr.) Leger, L. (Cochin
Paris), R. Abelanet, G. Lemaigre and R.
mot. Presse Med. 75(4):177-182, 1967.

uses of portal hypertension are systemetized
general types: (1) Presinusoidal blocking:
hypertension due to compression or obstruc-
f intrahepatic branches of the portal vein
s occur in schistosomiasis, essential hepatic
ension and biliary fibroadenomatosis. In
osomiasis, inflammatory granulomatosis is
followed by thrombophlebitis, recanalization
thrombus, always with increased resistance
od flow, in branches of the portal vein and
mes in the portal vein itself. Occasionally
in or veins may be completely and perma-
blocked; portal pressure is elevated and
leen enlarged (sometimes to twice normal
pressure in the hepatic veins is normal.
ential hypertension of the liver, portal
re is high with no evident cause; the 1
te factor known in essential hepatic hyper-
n is the inelasticity in the entire or
f the portal bed. Biliary fibroadenomatosis
ked by biliary cysts and extensive biliary
roliferation, dense sclerosis of parenchyma,
rtal fibrosis, all contributing to in-
d portal pressure. (2) Postsinusoidal
ng: portal hypertension due to obstruc-
f hepatic veins is most often seen in
c cirrhosis; obliterating fibrosis of the
c veins causes ascites; the arterial system
mal; despite many structural modifications
branches of the portal vein, such as
ement of the lumen, no thrombosis has ever
oted; the venules become encased in a com-
f elastic fibers conferring a ridigity
his part of the system; 75% of cases show
oses in branches of the hepatic veins.
al management has been by splenectomy,
er of splenic venous flow to the renal
and portacaval anastomoses according to
quirements of the individual case. Blood
re was measured in the portal vein and in
patic vein; pressure was reduced from 24
hepatic vein to 10 mm Hg in 1 instance.
epatic portal pressures were usually about
Hg reduced by operation to 10 mm Hg or less.

OBSERVATIONS ON SHOCK PRODUCED BY
ACUTE PORTAL OBSTRUCTION. EXPERIMENTAL
(Gr.) Blatzas, G., P. Andreadis, D.
dakis and C. Tountas. Galenus 9(2):65-73,

portal obstruction was produced in 12 dogs.
of these were inj. with pituitrin (10 mg/kg
t./hr.) prior to the application of portal
ction. Observations on the control animals
a rapid decline in blood pressure and
blood pressure until stabilized to a lower
while the portal venous pressure in-
d to about 90 cm H_2O. Temporary brady-
was also observed after the obstruction was effected. The electrolyte picture was as follows: Serum Na unchanged, serum K increased by 0.5 mEq/liter, and the pH dropped to 6.8 (from 7.3); hemoglobin and hematocrit increased. In the animals inj. with pituitrin there was a fall in the arterial blood pressure which was, however, less rapid than in the control animals, due to the vasoconstricting effect of pituitrin on the mesenteric arterioles. The hemoglobin and hematrocrit were increased due to the pooling effect of blood in the portal circulation; the portal venous pressure was lower than in the control animals and the pH was reduced lower than in the controls due to reduction of blood vol. following reduced catecholamine effect. Pituitrin reduced the degree of shock and increased the survival rate of the dogs following removal of the obstruction. All animals died within approx. 2 hr. after the obstruction was effected, if the latter lasted for more than 22 min. This can be explained by the toxic effects of metabolic byproducts that were not removed adequately from the circulation.

9476 THE EFFECT OF PARTIAL PORTACAVAL TRANSPOSITION ON THE CANINE LIVER. (E.) Marchioro, T. L. (U. Colorado Sch. Med., Denver), K. A. Porter, B. I. Brown, J. B. Otte and T. E. Starzl. Surgery 61(5):723-732, 1967.

Partial portacaval transposition was performed, anastomosing the supra-adrenal inferior vena cava to either the right or left branch of the main portal vein. In the resulting preparation nonhepatic splanchnic venous blood supplied 1 portion of the liver whereas systemic venous blood perfused the remaining portion. Three dogs with right, and 4 dogs with left, transposition were studied for 10-94 days. No clinical abnormalities were seen but both gross and microscopic atrophy were marked as was glycogenolysis in that portion of the liver receiving systemic venous blood. An electromagnetic square wave flowmeter was used in blood flow studies in another 8 dogs. Flow was measured in branches of both right and left portal vein before and from 1 to 4 hr. after partial transposition to either the right, in 4 dogs, or to the left in another 4 dogs. Rates of flow remained unchanged in 5 instances, increased in 11 instances. In another study 2 dogs received a jugular venous autograft between the abdominal aorta and the right or left main portal vein branch. Both atrophy and glycogenolysis in the portion receiving arterial blood were comparable to that described above in liver fractions perfused with systemic venous blood. As a result of these and earlier studies the authors suggest the existence of a hepatotropic substance in splanchnic venous blood.

9477 MESENTERIC-CAVAL ANASTOMOSIS FOR PORTAL DECOMPRESSION. (E.) Zuidema, G. D. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and P. A. Ebert. Johns Hopkins Med. J. 120(4):201-209, 1967.

This technic was used in children (9) and adults (3; previously splenectomized) with extrahepatic block, and provides excellent portal decompression using relatively large vessels. Risk of thrombosis is low, the outlook for prevention of recurrent variceal hemorrhage good. A right paramedian incision is made in the abdomen; the transverse colon elevated superiorly; the small intestine retracted downward. Portal venous pressure is measured in a small mesenteric tributary, and this system is visualized by inj. of 25 ml 50% Hypaque. In extrahepatic block, if the superior mesenteric vein is suitable for anastomosis, it is exposed at the inferior base of the transverse mesocolon near the entrance of the right colic vein, is dissected and a 2-3-inch segment isolated. The right colon is mobilized; the retroperitoneal structures exposed; the inferior vena cava dissected from the level of the renal veins to below both iliac bifurcations; all tributaries ligated and divided to free the entire vessel. A tunnel is made in the mesentery posterior to the superior mesenteric vein so that the divided vena cava can be passed anteriorly. The latter is occluded below the renal veins, and both common iliac veins occluded. The latter are divided below the bifurcation, the distal ends oversewn with arterial sutures. A suture is placed in each corner of the proximal right iliac vein and these sutures are passed through the tunnel, avoiding any tension on the vena cava. When properly placed, the vena cava is divided, the bifurcation discarded. Only rarely (in obesity, low-lying duodenum) must the iliac vein be used for the anastomosis. The superior mesenteric vein is clamped and rotated so that an ellipse may be excised from its posterior wall. Posterior suture line is 5-0 silk continuous over and over everting stich; anterior, interrupted 5-0 silk everting mattress sutures. The right colon is returned to normal position, but not sutured in place. Pressure is measured after completion of shunt, the peritoneum over superior mesenteric vein closed and liver biopsy made. Of 9 children, 7 were successfully operated on. After up to 3 yr., none have experienced subsequent hemorrhage. One adult, who was operated on in an emergency, had postoperative recurrent variceal hemorrhage, requiring transthoracic variceal ligation, and massive edema of lower extremities, but has been well for 2 yr.

9478 EXPERIMENTAL STUDIES OF THE POSSIBILITY OF SHUNTING PORTAL BLOOD THROUGH CHANNELS MADE OF BONE AND CONNECTING THE SPLEEN AND LIVER.

(It.) Rapisarda, L. M. (U. Palermo, Italy) and M. Romano. Minerva Chir. 22(5):232-238, 1967.

In 1 group of dogs, progressive portal hypertension was induced by inserting a cellophane sheath into the portal vein at the level of the hepatic hilus. In a second group, porous bone derived from the rib of the same animal was used to form a permanent connection between the spleen and liver, 120 days before occlusion of the portal vein by means of a tourniquet. In a third group, progressive portal hypertension was induced by a cellophane sheath,
as above, at the same time a similar osseous c
nection between the spleen and liver was const
As compared to the hypertensive controls, both
groups of animals bearing the osseous shunts
achieved a significant degree of decompressio
portal hypertension, due in part to the artifi
shunt and in part to the progressive developme
a network of vascular (and connective-tissue)
neoformations surrounding it.

9479 TECHNIC FOR THE EXTRACORPOREAL CIRCU TION OF THE LIVER ISOLATED IN SITU.

(It.) Benzi, G. (U. Pavia, Italy). Farmaco
[Prat.] 22(5):276-283, 1967.

The method has been used on 22 dogs (11.7-29 k
body wt.) and 4 baboons (wt. 11.4-16.2 kg)
following preanesthesia with urethan and durir
closed circuit anesthesia with nitrous oxide,
cyclopropane, ether, and others. Venous bloo
from the hepatic veins was made to flow throu
a portion of the inferior vena cava. After
proper treatment, oxygenated blood was returne
to the liver through the terminal branches of
the portal vein, since the hepatic artery has
been ligated. In various preliminary experiments, arterial perfusion was attempted by mea
of the hepatic artery itself, after having
ligated the portal vein. No differences were
observed with regard to hepatic behavior with
either technic, although biological and metabolic studies were more easily performed usin
the portal system as the afferent blood suppl
During a perfusion period of 2-4 hr. various
serum determinations were performed on blood
from the extracorporeal hepatic circuit: SGP
sorbital dehydrogenase, and leucine aminopeptidase levels were normal, while SGOT leve
gradually increased with time. The above
technic can be added to the conventional meth
of studying hepatic metabolizing activity
inasmuch as it avoids both direct metabolic
interference with other organs or tissues and
various modifications which in vitro methods
induce in different substrates.

9480 INDICATIONS AND OPERATIVE PROCEDURE FOR PORTOCAVAL ANASTOMOSIS. (E.)

Zenker, R. (Munich U. Sch. Med., Germany) and
H. Hamelmann. J. Cardiov. Surg. 8(2):136-141,
1967.

In a review of 75 of these operative procedure
hepatic failure, and not technical problems, w
responsible for almost all operative fatalitie
An index for determination of operative risk a
postoperative prognosis was formulated after t
clinical coefficient of Leger. The criteria
and their point values are: precoma/coma, 6;
60 yr. or older, 4; recurrent bleedings, 4;
therapy-resistant ascites, 6; transient ascite
3; total bilirubin 1.2-2 mg%, 3 (above 2 mg%,
serum albumin 3 g% or less, 4; prothrombin tim
of 50% or less, 4; Takata of 50 mg% or less, 4
platelet count of 100,000 or less, 2; edema of
extremities, 2. With index less than 12,

val was 93% (25 of 27); at 13-16, survival
50%, with ascites the most common; at 17 or
e, mortality was 90%. In the last group
emergency operations on recurrent bleeding,
py-resistant ascites, and those with low
l protein values. Use of the index in this
reduced the operative mortality from 30%
2% (1 in 16). In cases of ascites, the
nction must be made between parenchymal
position as the cause of ascites and ascites
e result of mechanovascular decompensation.
e latter group, portacaval anastomosis
best results. The authors preferred
inal incision, selected the anastomosis on
asis of anatomical presentation and always
pted side-to-side anastomosis in ascites.

HEMOSTASIS IN HEPATIC SURGERY BY MEANS
OF TEMPORARY OCCLUSION OF THE AFFERENT
VESSELS OF THE LIVER. EXPERIMENTAL STUDY.
De Santis, U. (Sant'Omero Civil Hosp.,
o, Italy). Ann. Ital. Chir. 43(2):349-357,

wing ether anesthesia and aperture of the
en, the afferent blood vessels of the liver
slowly clamped in 15 rabbits of both sexes
ing approx. 2 kg. Five animals (Group 1)
clamped for 10-12 min.; 5 (Group 2) were
ed for 20-22 min., 2 of which were treated
chlortetracycline before and after surgery;
oup 3) were clamped for 20-22 min. under
hermia obtained by peritoneal irrigation
saline cooled to 1°C. Some animals were
ficed 48 hr. after surgery, and histological
es of liver fragments were performed.
ving animals were followed for approx. 1 mo.
ls of Group 1 showed edema and cyanosis of
esentery and intestinal wall which regressed
on as the clamp was removed; microscopic
es revealed normal lobar structure, hepa-
es, and biliary ducts along with slight
nce of vacuolation. Animals of Group 2
d enlarged spleen, marked intestinal
sis, and irreversible hemorrhagic lesions;
animals died within 48-72 hr., except the
ated with chlortetracycline who survived;
vacuolization with fragmentation and dis-
ation of the nucleus and protoplasm was
ved microscopically. All animals of Group 3
ved; histologically, hepatic structure was
rved and no vascular repletion was observed;
cells had a spongy appearance. Results
ate that temporary occlusion of the
ent blood vessels of the liver can be toler-
for periods of approx. 10 min., after which,
ional and anatomical changes of varying
e cause death. Mortality is lowered in
ls in which occlusion lasts more than 10
es if an antibiotic is admin. before and
surgery. Mortality was markedly lessened
imals in which occlusion was performed for
ng as 20 min. under hypothermia.

HETEROLOGOUS LIVER PERFUSION IN ACUTE
HEPATIC FAILURE. (E.) Watts, J. McK.
(Monash U., Victoria, Australia), H. A. F.
Dudley, F. W. Gurr and J. A. Owen. Brit. Med. J.
2(5548):341-345, 1967.

The liver (1-1.2 kg) was removed from a pig (30-40 kg) aseptically. The cystic duct was ligated, and the hepatic artery, portal vein, inferior vena cava and common bile duct were cannulated before the hepatic vascular tree was flushed free of blood with heparinized Ringer's lactate. The patient's arterial blood fed from an indwelling arteriovenous shunt (brachial artery), by means of a heat-exchanger, into the hepatic artery and portal vein of the pig liver, from which venous blood drained by gravity into a venous reservoir and was then pumped back into the patient's cephalic vein. Whole-body and regional heparinization were used in 3 perfusions each. Fluid exuded from the liver surface was collected and its vol. replaced by a continuous infusion of 5% human serum albumin. Bile was collected at 30-min. intervals; flow rate and blood chemistry (including arterial pO_2 and pCO_2) were measured intermittently; liver temperature and blood pH were maintained within physiological limits. Of 3 patients perfused, 1 survived. Septicemia, hypocalcemia, thrombocytopenia, and prolonged prothrombin time occurred in all 3; renal failure and gastrointestinal bleeding in 2; hypoglycemia and status epilepticus in 1 each. In 5 of 6 perfusions, there was a definite lightening of consciousness and increased response to stimulation. The extracorporeal liver extracted ammonia and bilirubin from plasma, secreted bile, and utilized O_2. Flow rate in 2 of 6 perfusions was less than the required 0.5 ml/g liver/min. The required shunt was large, but when it was maintained, acidosis and hypotension did not occur. The 2 perfusions in the surviving patient were of 8 and 9 hr. duration.

9483 BLOOD AMMONIA IN PATIENTS WITH PORTAL HYPERTENSION SYNDROME WHO UNDERGO SHUNT SURGERY. (It.) Santangelo, M. L. (U. Naples, Italy), N. Ricciardelli, E. Triggiani, C. Corsale and E. Antonini. Fegato 12(4): 389-407, 1966.

Elevated blood ammonia was found before surgery in all of 22 patients undergoing shunt operations for portal hypertension secondary to hepatic cirrhosis. The patient group included a boy and a girl aged 11 yr.; two 12-yr.-old boys; 2 boys aged 14 and 15, resp.; 10 men and 6 women, aged 19-62. In all 22, blood ammonia was increased immediately after shunt surgery, rising from a mean of 225-343 μg/ml. In most cases, but not all, it fell within 15 days to approx. preoperative levels (mean = 234 μg/ml). The degree of postoperative increase observed was directly proportional to the width of the shunt. There was no significant correlation between postoperative blood ammonia levels and postoperative encephalopathy. It is concluded that partial shunt operations are probably to be preferred to total ones.

9484 MEASUREMENT OF HEPATIC BLOOD FLOW BY ^{85}Cr IN RATS DURING SHOCK CAUSED BY BLOOD LOSS. (Ger.) Waldeck, F. (Johannes Gutenberg U., Mainz, Germany), H. Hutten and J. Grote. Pflueger. Arch. Ges. Physiol. 294(3): 201-213, 1967.

After inj. of heparin (250-350 g), rats were catheterized (1) in the aorta through a carotid artery and (2) in the portal vein through a mesenteric vein. The arterial catheter was connected by means of a 3-way valve to a Statham strain (pressure) gauge or to a graduated syringe for the withdrawal or reinfusion of blood. The portal catheter ended in a T-tube, 1 limb connected to a chamber containing a strain gauge, the other to a syringe for intraportal inj. Strain gauge voltages amplified and calibrated were recorded as pressures in mm Hg. $^{85}CrCl_3$ in 0.9% NaCl soln. was used as the indicator; each ml contained 0.825 mc; a shock inj. of 0.1-0.15 ml was admin. by the portal vein; radioactivity, reaching a max. of 3.10^3 impulses/min., was detected on the surface of the liver and recorded twice, once as a linear number of impulses/min., the other as a logarithmic function. From the simple logarithmic plot of the half-life curves the rates of blood flow were calculated using one or the other of 2 formulas which yield close results. One of these, $\bar{f} = \lambda \frac{0.693}{T\ 1/2}$ where $\bar{f}$ is the av. flow in ml/g of tissue/min.; λ = 0.987, the partition coefficient of the isotope between blood and tissue and T 1/2 = half life of the isotope = 27 sec. = 0.45 min. when mean arterial pressure = 110 mm Hg. $\bar{f} = 0.987 \frac{0.693}{0.45} = 1.52$ ml/g of tissue/min. As blood pressure decreased from normal, blood flow decreased exponentially. Apparently below an arterial pressure of 60 mm Hg or portal pressures below about 5 mm Hg resistance in the liver increased very rapidly because these pressures were below the critical pressure for the opening of sinusoids.

9485 HEPATIC RHEOGRAM CHANGES IN VARIOUS DISEASES. (Rus.) Tadzhiev, K. T. (Tadzhik Med. Inst., USSR) and G. I. Nosenko. Sovet. Med. 30(2):13-19, 1967.

In 20 healthy adults (20-30 yr. old), the rheographic index fluctuated between 1.1-1.8 (av. 1.5), the systolic rise of the rheogram or Q-B interval was 0.08-0.15 sec. (av. 0.11), duration of the period of quick filling or B-C interval was 0.15-0.21 sec. (av. 0.19), total duration of systolic filling or B-D interval was 0.17-0.30 sec. (av. 0.27), and intrasystolic indicator of filling was 69-75%. Of 67 patients with various diseases, 27 were treated surgically. In 10 patients with atrophic hepatic cirrhosis and ascites (and probably 10 patients with splenomegalic hepatic cirrhosis without ascites), the Q-B interval was 0.09-0.14 sec. (av. 0.11), the rheographic index was 0.2-0.8 (av. 0.4), B-C interval was 0.08-0.18 sec. (av. 0.13) and the intrasystolic indicator of filling was 30-62%. The hepatic rheogram remained unchanged in 2 patients with cancer o
the papilla of Vater and acute obturation of t
common bile duct. In 3 patients with cancer o
the pancreas and in 4 of 7 patients with
cholelithiasis, the B-C interval was 0.09-0.14
sec., intrasystolic indicator or filling was l
than 60% and the rheographic index was 0.7-0.9
In 10 patients with atherosclerosis the rheographic index was 0.8-1.1, the Q-B interval wa
0.11-0.15 sec., the B-C interval was 0.16-0.19
sec. and the intrasystolic indicator of fillin
was 50-65%. In 4 of 5 patients with Pick's
pseudocirrhosis, the Q-B interval was 0.16-0.2
sec., and in 5 of 5 the B-C interval was
shortened and the intrasystolic indicator of
filling was 40-55%. In 20 patients with mitra
valve disease predominantly with stenosis, the
rheographic index was 0.8-1.0, the Q-B interva
was 0.18-0.20 sec., B-C interval was 0.10-0.10
and the intrasystolic indicator of filling was
50-65%.

9486 TREATMENT OF THE BUDD-CHIARI SYNDROM
ANATOMIC AND TECHNICAL BASES FOR A
PORTO-ATRIAL VASCULAR INTERCONNECTION. (Fr.)
Marion, P. and A. Bouchet. Lyon Chir. 63(2):
266-273, 1967.

This technic has never been employed in a case
of the syndrome; the details have been worked
out in cadavers and the operation has successfully been done experimentally in the dog.
Briefly the proposed solution is the use of a
Dacron or similar prosthetic tube, connecting
the portal vein with the right atrium by the
shortest route; the mobilization of the left
lobe of the liver by section of the triangula
ligament known as Turner's maneuver in gastro-
esophageal surgery furnishes a direct pathway
from the liver, the fissure of the venous
ligament or the canal of Arantius, between th
left and the dorsal lobes of the liver; after
proper dissection the tube is implanted in th
portal vein at the atrium, passed to the thor
through the diaphragm to the left of the
falciform ligament. The upper implantation i
in the right atrium without excessive tractio
using nylon thread and double sutures. The
implantation into the right atrium is superio
to implantation in the caval vein which is mo
delicate and susceptible to stenosis. The
length of the prosthetic vessel is about 9-10

9487 EXPERIMENTAL STUDIES ON THE LYMPHAT
CIRCULATION OF THE LIVER. X. EFFE
OF LIGATING THE EFFERENT LYMPHATIC VESSELS OF
LIVER. (Fr.) Mallet-Guy, P. (Edouard Herrio
Hosp., Lyon, France), Y. Mandairon and G.
Yoshitomi. Lyon Chir. 63(2):217-225, 1967.

To trace the lymphatic channels draining the
liver, the bile duct was cannulated with the
gallbladder clamped in anesthetized dogs with
tracheal intubation and artificial respiratio
A soln. of Chicago blue (20 trials) was inj.

g a constant pressure of 50 cm H_2O; the
shold pressure was 32 cm H_2O. In a few min.
efferent lymphatics of the liver were colored;
the branches made visible were tied off by
n thread. The dogs were examined 3-8 days
r for the presence of ascites, the condition
he liver and the deposition of fibrin on the
ace. Ten trials were made by inj. of $BaSO_4$
radiography, and 3 by both technics succes-
ly. Ascites occurred in 12 cases, 50-300 ml,
latively small vol. but true ascitic fluid as
ed by fibrin deposits and by increased vol.
he liver. Biopsy revealed vascular congestion
edema of the spaces of Dissé, 6 cases showed
hatic vessels colored blue and ligated, with
race of Chicago blue in the thoracic duct,
with no visible changes; this was also true
5 cases inj. with $BaSO_4$; the remaining
als showed a true ascites but a lymphatic
on the lower face of the liver which had
ped ligation. In view of these results it
s that, in some animals at least, biliary
phatic)-blood connections must exist.

CHANGES IN BLOOD CLOTTING FACTORS AFTER MASSIVE LIVER RESECTION AND TOTAL
TECTOMY IN DOGS. (E.) Niléhn, J.-E. (U.
, Malmo, Sweden), K.-F. Aronsen and B.
sson. Acta Chir. Scand. 133(3):183-188, 1967.

(14) were subjected to liver resection
60% by wt.) and 6 to total hepatectomy; they
followed postoperatively for changes in
r blood clotting factors, fibrinogen,
inolysis and degradation products of
inogen and/or fibrin, Factors V, VIII and IX,
the prothrombin group (Factors II, VII and X).
effect of the fibrinolytic inhibitor, amino-
yl-cyclohexane-carboxylic acid, on some clot-
factors was studied in partially-hepatectomized
als. In dogs subjected to partial hepatectomy,
most marked changes were noted in prothrombin
Factor V, which 1-2 days after operation fell
0%-50%, resp., of their pre-operative values.
the prothrombin group and Factor V became
st normal within 1 wk. There was slight
rinolytic activity, and after an initial
rease, the fibrinogen level rose in a manner
logous to that after an ordinary operative
cedure. Amino-methyl-cyclohexane-carboxylic
d (0.02 g/kg given 5 times) had no substantial
ect on the various coagulation factors in
s. Total hepatectomy was followed by a
ked decrease of the prothrombin group and
rinogen. Fibrinolytic activity on heated and
eated fibrin plates was demonstrated, as well
degradation products of fibrinogen and/or
rin.

9 STUDIES ON BLOOD CLOTTING FACTORS IN MAN AFTER MASSIVE LIVER RESECTION.
) Niléhn, J. E. (U. Lund, Sweden), I. M.
sson, K. F. Aronsen and B. Ericsson. Acta
r. Scand. 133(3):189-195, 1967.

Five patients (1 woman, 4 men; 44-70 yr. old) with liver carcinoma and one 20-yr.-old male with liver rupture were subjected to massive liver resection, and the postoperative course of various blood clotting factors followed. In all 6 cases there were only minor changes in the coagulation time, bleeding time, 1-stage prothrombin time, recalcification time, prothrombin consumption and the inhibitors of activation of plasminogen by urokinase. The prothrombin group (Factors II, VII and X), Factor V, Factor IX, fibrinogen and plasminogen were all markedly decreased postoperatively. Factor V recovered preoperative levels about 1 wk. after surgery, while the prothrombin group and Factor IX reached preoperative values approx. 3-6 wk. after the operation. During the postoperative course, values of the antihemophilia factor were high in all 6 patients. The number of platelets recorded in 5 of the 6 patients tended to decrease after the operation and to reach their preoperative level 1-2 wk. after the operation. The plasminogen level was low after the operation and recovered its preoperative level 1-2 wk. after the operation. The occurrence of split products of fibrinogen and/or fibrin was also demonstrated. All coagulation factors recovered normal values 4-6 wk. after the operation.

9490 NEW POSSIBILITIES OF LIVER RESECTION AFFORDED BY CRUSHING THE PARENCHYMA UNDER A SLIDING PRESSURE (FINGER FRACTURE) WITH REFERENCE TO SIX RECENT CASES OF VARIOUS TYPES.

(Fr.) Bourgeon, R. and M. Guntz. Mem. Acad. Chir. (Paris) 93(15-16):486-496, 1967.

The usual resection of the liver follows well-regulated and anatomically-determined plans; within these limits are resections for benign tumors, inflammatory lesions and trauma; resections more limited for small malignancies, often metastatic; and large resections for malignant primary tumors. The technic of crushing the parenchyma has been used by Asiatic surgeons, demonstrated in France, and adopted by some French surgeons. The authors review 6 personal cases treated by this technic. These were (1) resection of Segment VI (Burgeon et al.) for abscess; (2) right hemihepatectomy for contusion; (3) resection of Segments IV and V for central metastases; (4) resection of Segment III for polycystic condition; (5) resection of Segment IV due to multiple metastases; (6) left hemihepatectomy due to angioma of the left lobe. These varied and extensive operations in patients 10.5-68 yr. old have been successful, with complications in 2 cases apparently caused by early removal of drains and subsequently corrected. The details of the "finger fracture" method which allows delicate realization of arteries, veins and ducts are simple and well known. The great advantage of this method is the subsequent regeneration of a healthy parenchyma. It is possible to enlarge the hilum of the liver either to the right or left; the mobilization of Segment IV is possible without uncovering the hilus. The control of blood flow is most important to prevent undue loss of blood. The stoppage of portal blood flow can be maintained for 10 min. without danger. Complete block is relieved as soon as possible by partial blood flow. Prolonged cessation of portal blood flow may cause hypertension and hemorrhage elsewhere as well as accumulation of blood in the splanchnic bed.

9491 SWELLING OF ISOLATED MITOCHONDRIAL SUSPENSIONS OBTAINED FROM NORMAL AND PATHOLOGICAL HUMAN LIVERS.

(It.) Giglio, F. (U. Palermo, Italy), L. Pagliaro, G. Migneco, S. Le Moli and A. Notarbartolo. Fegato 12(4): 455-467, 1966.

Mitochondrial swelling was studied in suspensions obtained from 8 normal subjects, 16 patients with various stages of hepatic cirrhosis, and 4 patients with acute hepatitis. Novelli's method was used, in which swelling was determined by the decrease in optical density at 520 mμ of mitochondria suspended in buffered 0.25 M sucrose at pH of 7.15, 8.2, and 5.8. Mitochondrial preparations from patients with cirrhosis showed a much slower optical density decrease at pH of 7.15 than did normal subjects, and after 20 min. the decrease was markedly less in the former group; at pH of 8.2, a marked decrease was observed in cirrhotic patients and final values in both cirrhotic patients and normal subjects were practically the same; at pH of 5.8, the decrease in cirrhotic patients was slight. In patients with hepatitis, the decrease was slightly less than in normal subjects but markedly greater than that of cirrhotic patients at pH of 7.15; the decrease was similar to that seen in normal subjects at pH of 5.8 and 8.2. The results indicate that the degree of mitochondrial swelling in patients with hepatitis is similar to that observed in normal subjects, indicating relatively moderate mitochondrial damage, at least in the acute stage of hepatitis. The relatively smaller decrease in cirrhotic patients suggests that the mitochondria are already partially swollen and their capacity for further swelling greatly reduced. These results are confirmed by previous experimental studies in which mitochondrial swelling curves at pH of 7.15, 8.2, and 5.8 of rats following incubation at 38°C were similar to those of cirrhotic patients in the present study, while the swelling curves of rats not previously incubated were similar to those of normal subjects in the present study.

9492 RELATIONSHIPS OF CHANGES IN THE TONGUE IN LIVER CIRRHOSIS AND CHRONIC HEPATITIS WITH REFERENCE TO MICROCIRCULATION AND LIVER STRUCTURE.

(Ger.) Jacoby, H. (U. Cologne, Germany) and R. Phlippen. Med. Welt 18(11):613-617, 1967.

Vital microscope examinations were made of the tongue in 106 cases of liver disorders. Examinations were made visually by means of a modified capillary microscope. Photomicrograph were also obtained. The vital visual and photo micrographic pictures presented 4 conditions: (1) the normal capillary with uniform calibers of the venular and arteriolar segments; (2) the congested capillary showing widening of the venular sector and a conic enlargement of the arteriolar segment of the capillary with an apparent cyanosis in the vascular bed especiall beyond the region of the venous plexi; (3) the "liver tongue" of Pannhorst a congested tongue with increased vol., marginal indentations of t teeth, violet-brown color, and on the underside strongly engorged veins; (4) the capillary with signs of peripheral disturbances in blood flow, showing small caliber precapillaries and following capillary segment with compensating enlargement of the venular end of the capillary; mostl accompanied by a slowed blood flow and increase cyanosis of the vascular bed, not characteristi of a single type of tongue. In the 106 cases o liver disorders (52 with liver cirrhosis, 39 with chronic hepatitis, and 15 others having chronic liver diseases such as fatty liver, cholangitis, and cholestasis), only 10 of these patients had allergies as well; because allergi states often cause the same changes in the capillary bed of the tongue these patients were not enumerated in the results. The relationship of allergy to liver diseases is quite probable, however. Some patients (16 liver cirrhoses, 9 hepatitis) showed a capillary picture of congestion (2); 47 patients (21 liver cirrhoses and 26 chronic hepatitis) presented a picture with signs of disturbed peripheral capillary circulation (4). Among the cirrhotic 8 presented a combination of capillary changes (2) and (4) as did 9 others with differing chronic liver damage. Finally, 7 patients with liver disease showed completely normal capillar beds. The appearance of the atrophic, smooth red tongue is caused by an altered metabolism o the liver, whereas the changes (2)-(4) above reflect structural changes in the blood vessels and sinusoids of the organ.

9493 CORTICOSTEROIDS IN THE TREATMENT OF CHRONIC HEPATITIS.

(Rus.) Loranskai T. I. (Inst. Nutr., Acad. Med. Sci., Moscow). Probl. Endokr. Gormonoter. 13(2):34-37, 1967.

Hormonal therapy, usually prednisolone (during the initial 1-3 days, 10-20 mg/day, then, in the subsequent 3-7 days, 30-40 mg/day, and thereafter the dose was gradually decreased; in the final 3-4 days, 10-40 U/day of ACTH, total 80-120 U, was added; the total dose of prednisolone/course was 250-500 mg in 15-20 days), was given to 33 patients (26 males, 7 females), of whom 23 had postnecrotic liver cirrhosis (17 of 23 had cirrhosis with hepatomegaly, 6 of 23 the portal form of cirrhosis) after ineffective treatment with diet and vitamins; 10 patients with chronic hepatitis (in the remission stage) with hyperbilirubinemi

also treated in this manner. In most
ents with hepatic cirrhosis, hormonal therapy
positive results: the general condition
oved, positive shifts in biochemical indices
noted (total protein level was normalized in
-globulins decreased and lipoproteins re-
ed unchanged), and a remission developed in
23 (the enzymatic activity was normalized,
dice disappeared and protein picture showed
sitive shift). When treatment was dis-
inued, there was an exacerbation in 3
ents; in the author's opinion, this was due
too rapid withdrawal of the drug. Of 3
ents who showed an increased transaminase
vity after treatment and exacerbation induced
iscontinuation of hormonal therapy, 2 died
5 days later and, in 1, remission was obtained
r repeated treatment with hormones. Treat-
was without effect in 7 patients with
tive hepatitis with hyperbilirubinemia.
-effects such as dyspeptic disorders (5),
p disorders (7) and irritability, disappeared
iscontinuation of treatment, while 2 had
sient glucosuria.

THE CONCENTRATION OF CONJUGATED SERUM BILE ACIDS IN DISEASES OF THE LIVER.

.) Frosch, B. (Med. Univ., Heidelberg, Germany).
. Deutsch. Ges. Inn. Med. 72:697-701, 1967.

w method makes possible the exact deter-
tion of conjugated bile acids in human serum
h is first extracted with hot ethanol; some
ds are separated by partition in ether,
nol, heptan and water. The final partition
ccomplished by thin-layer chromotography
h simultaneously separates serum bile acids,
bilirubins, the phosphatides, and the mono-
erides from the conjugated bile acids. This
od is capable of the quantitative deter-
tion of 0.5 μg of the individual bile acid/ml
erum. The sera of 31 normal controls showed
onjugated bile acids. In some individuals
formerly suffered from hepatitis no
ugated bile acids could be demonstrated. At
beginning of hepatitis there was a sudden
ease in the total conjugated bile acids
ng to 226 μg/ml, then falling to 15 μg/ml
in 5 wk. Both conjugates of taurocholate
glycocholate follow the same course. The
. of these compounds remained elevated after
rubin and transaminases returned to normal.
group of 23 hepatitis patients the con-
ted bile acids av. 50 μg/ml 100 days after
t of the disease, after which the return to
al was more rapid.

PARENTERAL MAGNESIUM THERAPY IN CHRONIC LIVER DISEASE.

(Ger.) Merker, G.
nrich Heine Clin. Hosp., Potsdam-Neufahrland,
any) and O. Selisko. Z. Ges. Inn. Med.
):182-185, 1967.

on, as a soln. of Mg adipinate containing
g of Mg/ml was inj. i.v., 5 ml in the first dose and 10 ml in succeeding doses, 18-20 times over 4 wk., in 24 cases of viral hepatitis, 38 of chronic hepatitis and 23 of hepatic cirrhosis. All patients received the usual therapy for liver disorders, as did other control patients who did not receive Mg inj. Fifteen patients (62.5%) of 24 with viral hepatitis who received Mg were clinically and serologically improved as compared to 5 (20.8%) of 24 without Mg. Of 38 patients with chronic hepatitis receiving Mg, 28 (73.6%) were similarly improved as compared to 13 (36.1%) of 36 without Mg. The corresponding figures for hepatic cirrhosis were 17 (74.0%) of 23 with Mg and 10 (45.5%) of 22 without Mg. The overall values were 60 (70.5%) of 85 with Mg and 28 (34.1%) of 82 without Mg. The patients received no other medication. Mg may increase blood flow through the liver tissue, as well as activate many enzymes. There seems to be a synergism between the Mg and vitamin E in reducing initial fatty infiltration of liver tissue (seen in rat experiments) which needs confirmation in man.

9496 IRON DISTRIBUTION IN THE LIVER OF PATIENTS WITH THALASSAEMIA MAJOR.

(E.) Berry, C. L. (Hosp. Sick Child., London) and W. C. Marshall. Lancet 1(7498):1031-1033, 1967.

Liver distribution of Fe was studied in 17 patients with thalassemia major; 7 (5 males, 2 females; 3.9-12 yr. old) were not splenectomized and 10 (4 males, 6 females; 4-13.5 yr. old) were splenectomized. The mean and range of serum Fe in splenectomized and nonsplenectomized groups was 189.7 (148-240) μg/100 ml and 183.4 (156-196) μg/100 ml, resp. Serum Fe-binding-capacity was comparable in the 2 groups, the mean (and range) being 257.2 (193-399) μg/100 ml in splenectomized individuals and 261.1 (197-342) μg/100 ml in nonsplenectomized patients. Liver biopsy (with a modified Vim-Silverman needle) revealed hepatic structure that was generally well maintained but had frequent portal fibrosis. No significant fatty change was observed in any case. Two main types of Fe storage were found: 1) parenchymal, with widespread heavy deposition of stainable Fe in parenchymal cells, associated Fe-distended macrophages in portal areas and Fe-containing Kupffer cells; and 2) nonparenchymal, with heavy loading of Kupffer cells, the presence of many Fe-distended macrophages and some free Fe in portal areas but with little involvement of parenchymal cells. The latter type of storage was found in splenectomized patients; the parenchymal type was found in splenectomized patients. The site of storage was not correlated with age, sex, diet or severity of the disease (as judged by transfusion requirements). It did not seem likely that the spleen, by its capacity to store Fe, prevented hepatic Fe storage exceeding a certain level. These findings would seem to indicate a further contraindication to removal of the spleen.

9497 CURRENT SURGICAL TREATMENT OF HYDATID CYST OF THE LIVER AND ITS PRINCIPAL COMPLICATIONS: 600 OPERATED CASES. (Fr.) Guedj, P. (U. Constantine, Algeria), J. Gairoard, F. Morvan and J. Bogaert. J. Chir. (Paris) 93(2): 191-216, 1967.

Simple drainage, alone or preceded by partial cystectomy of external cysts, was the treatment of choice, even when the disease was severe; healing was rapid (av. 10-20 days) and the mortality was low (2% in the last 100 cases). Total cystectomy was indicated primarily in the presence of calcified hydatid cysts (3% of the group) and was sometimes associated with biliary tract surgery. The cysts opened into the biliary tract in 2.3% and compressed it in 1.65% of the group; acute hydatid cholecystitis was treated by cystectomy with cholecystectomy (simultaneously if possible); drainage procedures were less effective. Biliary lithiasis associated with hydatid cysts was noted in 7% of the group. Lung and bronchial involvement (2.8% of the group) was treated by drugs (e.g., pyramidone) or blood transfusions before surgery was attempted. Partial hepatectomy was rarely performed, and indicated only in patients with massive involvement of 1 liver lobe or active exogenous foci deeply infiltrating the liver parenchyma around a cyst. In the entire group of 600 patients, the mortality rate was 5.6%.

9498 EXPERIMENTAL HEPATIC COMA: EFFECT OF EXCHANGE TRANSFUSION ON METABOLISM AND SURVIVAL. (E.) Turcotte, J. G. (U. Michigan Med. Ctr., Ann Arbor), W. J. Mattson, Jr. and C. G. Child III. Surgery 62(1):189-194, 1967.

Hepatic coma was induced in 17 pairs of beagle dogs by fashioning an end-to-side portacaval shunt, and 24 hr. later ligating the common hepatic artery. In 1 member of each pair, a vol. of blood equal to 7% of body wt. was exchanged, and in the second member of the pair, a sham-exchange (blood withdrawn was reinj.) was done. The duration of survival after hepatic artery ligation was prolonged an av. of 16 hr., when dogs with equivalent liver damage were compared; no significant prolongation in survival was observed when the entire group of control and experimental animals were compared. Initial signs of hepatic coma were noted 4-18 hr. after hepatic artery ligation. During 70% of exchange transfusions performed while dogs were in coma, evidence of revival from coma was noted. Immediately after each exchange there was a significant decrease in SGOT and alkaline phosphatase, and a significant increase in lactate and pyruvate. Blood urea nitrogen and creatinine tended to rise, K and glucose decreased, and Na, P and Cl did not appreciably change. There were slight increases in phosphate and WBC, and hematocrit changed little. The changes in blood chemistry after exchange transfusion were the result of dilution, the addition of constituents in the donor blood and the continued effects of hepatic failure during the 1 hr. required for e change. Arousal from coma seen in animals duri exchange transfusion, and prolongation of life noted when animals with equivalent hepatic inju were compared, support the concept that exchang transfusion may be beneficial in some cases of hepatic come. When severe hepatic injury was present, exchange transfusion of 1 blood vol. h no demonstrable benefit in this experimental model.

9499 DISTURBANCES OF METABOLISM OF SINGLE AMINO ACIDS IN HEPATITIS AND HEPATIC CIRRHOSIS. (Ger.) Gerok, W. (U. Mainz, German and P. Bornhäuser. Verh. Deutsch. Ges. Inn. Me 72:692-697, 1967.

An investigation of the metabolism of histidine and methionine in cases of hepatitis and hepati cirrhosis was undertaken. The amino acids were determined by a quantitative columnar chromatographic technic. Formiminoglutamic acid was measured enzymatically through the use of formi glutamic transferase and cyclodeaminase obtaine from hog liver. Urocanic acid and additional imidazole derivatives were determined quantitatively by thin-layer chromatography. No significant difference was found in the normal controls with respect to urinary histidine excretion before and 24 hr. after oral loading, 226 and 243 mg/day, resp.; but among those with acute hepatitis the av. urinary excretion was 323 and 446 mg/day, and for those with hepatic cirrhosis 347 and 474 mg/day, resp. Urinary excretion (for 8 hr.) of formiminoglutamic acid in the controls without oral dosage of histidin was 1.1 μMol and with oral dosage 23.5 μMol; th corresponding fiqures in acute hepatitis were 8 and 146; in cirrhosis 5.2 and 137.5, resp. Liv disease patients also excreted imidazolactate a urocanic acid which could not be demonstrated in the urine of the controls. This indicates that the breakdown of histidine in hepatitis and in hepatic cirrhosis is inhibited by the transfer of 1 atom of carbon to tetrahydrofolic acid, resulting in the significant increase in formiminoglutamic acid. In liver disease a compensatory increase in deamination or in transamination into imidazolactactate occurs. One of the largest reactions in normal metaboli of methionine is the hydrolysis of a methyl group from activated methionine with the formation of homocysteine which, through the cystathionines, is split into cysteine and homoserine. This is the main route in the breakdown of methionine; a secondary pathway with only a very small rate is through α-keto-methiolbutyric acid and α-keto-butyric acid to α-aminobutyric acid. If the normal serum conc. of methionine, α-aminobutyric acid, cysteine, and serine are each taken as 100%, then the av. of these compounds in 10 patients with cirrhosi were 270, 225, 104 and 120%, resp. In hepatic cirrhosis the secondary pathway becomes

portant in the metabolism of methionine. It
suggested that these metabolic pathways and
oduct conc. may be of diagnostic value in
ver disease.

00 THE ELECTROLYTES OF PERSPIRATION DURING CHRONIC LIVER DISEASE IN THE ADULT.
r.) Bourel, M. (U. Rennes, France), P. Lenoir,
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e salt conc. of perspiration was measured in
subjects with alcoholic hepatic cirrhosis,
iopathic hemochromatosis, diabetes mellitus,
ronic bronchopneumonia, and a control group.
e perspiration was collected in ashfree filter
per suitably protected by a sheet of poly-
hylene, applied to a carefully-prepared
esternal area inj. cutaneously with 0.2-0.4
of physostigmine in four places 4 cm apart.
e data showed that the electrolytes excreted
the perspiration were normal in the 16
rrhotic, somewhat elevated among those with
iopathic hemochromatosis (16), and decidedly
ised in the diabetics. The vol. of perspiration
peared high among those with hemochromatosis
d bronchopneumonia.

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it. Med. J. 2(5555):809-810, 1967.

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OTEIN, WITH PRIMARY HEPATOMA. (Fr.) Uriel, J.
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De Nechaud, M. Birencwajg, R. Masseyeff, L.
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150 rabbits (both sexes; 330-4000 g wt.), the
ebral cortex was removed in 109, vagus nerve
ers were resected in 10, a partial mechanical
turbance of the solar plexus was induced in 9,
effect of ether narcosis on the condition of
liver was studied in 7, and 15 served as
trols having no surgery. No effect was noted
n ether narcosis. Intact animals showed no
ar borders between hepatic lobes, and hepatic
ls were arranged in deep ridges or depressions.
ediately after surgery (within the first few
s) the liver showed pronounced vascular dis-
ers which were manifest macroscopically in
egular polyemia of the organ; individual
tions showed dilated and blood-filled central
ns, and arteries, interlobular veins and inter-
ular capillaries; the hepatic lobes were
nged slightly. In the subsequent 3-7 days
re was extensive focal hyperemia, serous
lammation, hemorrhages, and dystrophic destruc-
e and necrotic changes of the hepatic parenchy-
After 7-12 days, inflammatory infiltration
eared at the sites of hemorrhages, and degenera-
e and necrotic changes; the rabbits developed
rrhea. Toward the third-fourth wk., hepatic
eremia markedly decreased and stasis dis-
eared; connective tissue appeared in the
enchyma and interlobar spaces. At 34 days
er surgery, inflammation disappeared and
nective tissue growth was distinct (it resembled
al cirrhosis); the animals were in good con-
ion, gained wt. and had no dyspeptic disorders.
a later period of observation (after 3-8 mo.),
condition of these rabbits exacerbated, usual-
in the spring and fall; at sacrifice, there
hepatic hyperemia, edema and stasis, i.e.,
process in the liver assumed a recurrent
rse and each exacerbation induced more pro-
nced morphologic changes. It is suggested that
the pathogenesis of acute and chronic hepatitis,
ions in various parts of the nervous system
play a definite role.

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ACUTE BERYLLIUM POISONING. (E.)
schi, H. P. (Med. Res. Council Lab., Carshalton,
rey, England) and W. N. Aldridge. *Biochem.*
rmacol. 16(2):263-278, 1967.

er male, Porton albino rats weighing 180-200
eceived beryllium (0.75 mg/kg, i.v.; LD$_{50}$ =
4 mg/kg, i.v.), the rate of disappearance of
er glycogen was comparable to that of controls
ing the first 8 hr. of fasting; after 30 hr.
fasting, however, liver glycogen conc. was 10
es as great as that found in controls. When
^{14}C]-labeled glucose was inj. i.v. at intervals
less than 6 hr. after poisoning, the amount of
eled glucose found in liver glycogen, 50 min.
later, was the same as that found in controls. When a comparable inj. was made 6 hr. after intoxication, the amount which appeared in liver glycogen was approx. 60% greater than that found in controls and the difference continued to increase progressively with the interval between poisoning and glucose admin. up to 24 hr. There were no significant, concurrent changes in terms of blood sugar level or specific activity of serum glucose. It was impossible to demonstrate the presence of glucose-1-phosphate in the livers of normal controls or in those derived from treated rats 2, 5 and 24 hr. after poisoning, although previous studies had shown that beryllium was a powerful inhibitor of phosphoglucomutase *in vitro*. The microsomal, lysosomal and mitochondrial enzyme systems did not appear to be affected significantly by the presence of the metal. It is concluded that the specific mechanisms of action through which beryllium induces necrosis of the liver could not be defined, and that a satisfactory biochemical explanation for its necrogenic activity remains to be found. Particular attention is drawn to the fact that the metal induced severe necrosis without significant early inhibition of protein synthesis.

9568 COMPARATIVE STUDY OF THE LIVER OF RATS TREATED WITH CHOLIC AND LITHOCHOLIC ACID, ALONG OR ASSOCIATED WITH BUTTER-YELLOW. (Fr.) Lacassagne, A. (Radium Inst., Paris), N. P. Buu-Hoi and L. Hurst. *Tumori* 53(1):43-54, 1967.

Male rats (380 g) were maintained on a semisynthetic diet poor in protein and riboflavin. To each kg of this semisynthetic diet was added 0.6 g of paradimethylaminobenzene (butter yellow) and 0.5 g of cholic acid fed to a second group. The same amount of lithocholic acid was substituted for cholic acid in the food of a third group. Animals were sacrificed between 126-278 days. A second set of experiments were carried out on male rats of the same av. wt. on a normal diet. To 1 kg of food 0.5 g of cholic acid was added for 1 group and 0.5 g of lithocholic acid was added for another group. No butter yellow was added to the diet of these animals. In the first set of experiments both cholic and lithocholic acids showed no accelerating action on the carcinogenicity of butter yellow. In fact, the daily admin. of lithocholic acid delayed the appearance and the succession of the stages produced by the toxic action of butter yellow admin. alone; cholic acid produced a similar effect with less retardation. Rats of the second set of experiments receiving cholic acid were sacrificed between 32-362 days. Rats receiving lithocholic acid only in this set of tests were sacrificed after 28-372 days The livers had increased by about 2 g in these animals but did not show any consistent pathologic change. There was not much difference between those receiving cholic acid and those receiving lithocholic acid. The general body wt. decreased in the first mo. but then increased somewhat (up to 100 g) for those on cholic acid. This addition tended to diminish and disappear in the animals on lithocholic acid. General toxicity was somewhat less with lithocholic than with cholic acid. This paradoxical effect of cholic and lithocholic acid upon carcinogenesis may, in part, result from the strain of rat used; all animals in these experiments were Wistar rats.

9569 HISTOLOGIC AND ULTRASTRUCTURAL STUDY OF EXPERIMENTAL HEPATIC FIBROSIS IN THE RAT AND THE PROTECTING EFFECT OF "HYMECHROMONE." (Fr.) Garrone, R. (Fac. Sci., Lyon, France), M. Pavans De Ceccatty, J. Chabert and L. Fontaine. C. R. Acad. Sci. (Paris) 264(11)(Ser. D):15[illegible]-1552, 1967.

Consecutive pathologic alterations were produced in the livers of white rats by biweekly inj. of CCl_4 (0.05 ml/100 g body wt.) for more than 2 mo. Liver tissue obtained at intervals during the time of CCl_4 admin. was examined by optical and electron microscopy with special attention to alterations and necrotic processes in the hepatocytes during advancing sclerosis. The objectives of this research were (1) the determination of critical stages during the degenerative changes, and (2) the testing of the compound, hymechromenone (H) (hydroxy-7,methyl-4,oxo-2, chromene-3), 400 mg/kg admin. in the daily ration; this substance has been reported to retard the toxic effects of CCl_4 when admin. simultaneously. The results were: (1) The hepatocytes at the onset of intoxication showed massing of smooth membranes marking a hyaline degeneration, then the cisternae of the reticulum formed vacuoles bringing about the characteristic appearance of a fatty, ballooning cell. Much later, in the mitochondria spherical opaque masses with a diameter of 1000-6000 Å were formed; these are reported to be $Ca_3(PO_4)_2$; the massive entrance of calcium, an inhibitor of oxidative phosphorylation, blocks the synthesis of ATP. This is the point of no-return. (2) The ballooning of the parenchyma proceeded (at the dosage of CCl_4 employed) rapidly for 15 days, then advanced more slowly until about 1 mo. when the number of ballooning cells became stabilized at 60% of the parenchymal area. As the area of the lost tissue reached 60%, the proliferation of collagen proceeded in 3 definite stages: In the 1st stage, fibrogenesis was perivascular and perisinusoidal; in the 2nd, periductal; and in the 3rd, intraparenchymatous which was the most intense stage and a landmark in the histologic restoration of the liver. The process of fiber formation is described. The series of tests with H showed that this substance to a degree did have an effect in protecting liver cells against CCl_4 within the time limit of the experiment.

9570 AUTOANTIGENICITY PHENOMENA IN CHRONIC EXPERIMENTAL HELIOTROPIN TOXICITY OF THE LIVER (TRANSMISSION OF THE AUTOIMMUNE COND TION). (Rus.) Burshtein, C. I. (Tashkent Med Inst., USSR). Vestn. Akad. Med. Nauk SSSR 22(2):34-35, 1967.

Normal Wistar rats received i.v. serum from ra with heliotropin (piperonal) toxic hepatitis (1.5-2.0 ml for 5-6 times, with a 2-3 day inte between inj.; the last inj. was through the portal vein); when sacrificed 1.5 mo. after th last inj. of serum, the rats had hepatitis wit pronounced dystrophy of the hepatic cells, deranged blood circulation, microcellular infilt tion, Küppfer cell hyperplasia, serum protein changes, increased activity of serum transamin and autoantibodies to their own liver extract. Controls (inj. with serum from healthy animals had similar, but less pronounced, histological changes without blood circulation changes; the blood displayed globulinemia (β-γ-globulins), hypoalbuminemia and a slight increase in serum transaminase activity. Lymphoid elements from mesenteric nodes (7-14 x 10^6 cells, admin. i.v at the time of donor sacrifice, and 10-20 x 10 cells admin. i.p. on the next day) of 95 donor with hepatitis were transferred to 31 recipien this established the following controls: 1) 1 nodes of healthy rats; 2) tissue from skeletal muscle of sick donors; 3) serum of rats with piperonal toxic hepatitis; and 4) piperonal (1 mg). Recipients showed definite changes in liver function, including a distinct increase the absorption of Rose Bengal by the liver as early as 1-2 wk. after inoculation. After 1-2 mo. the amount of absorption was decreased, an in several cases it remained above initial val No consistent changes were found in the contro group. Experimental animals, sacrificed 2.5-3 mo. afterward, had acute hepatitis with activa tion of the reticulo-endothelial system, nucle hyperchromatosis, hepatocytic hypertrophy and pronounced nuclear polymorphism; they also had edema of the mesenteric node capsule, sinus enlargement, reticular tissue hyperplasia and follicular atrophy. Also found were autoantibodies against liver tissue, decreased serum albumin and increased serum globulin, as well a positive thymol turbidity test. Controls ha either an absence or a low titer of autoantibodies, unchanged lymph nodes and a mild form hepatitis. Studies are still in progress, but in rats treated with serum from "piperonal" ra the absorptive powers of the liver were somewh decreased. In rats treated with piperonal and skeletal musculature there were no changes fro the normal.

9571 ESTERASES AND CLEARING FACTOR LIPASE IN EXPERIMENTAL RAT LIVER INJURY. (Katz, S. (P. B. Churruca Hosp., Buenos Aires, Argentina) and B. Kaplún. Acta Physiol. Lat. Amer. 16(3):241-248, 1966.

Esterolytic activity in liver and plasma was studied in rats after the i.p. inj. of CCl_4 or surgical ligation and excision of the common b

t using α-naphthyl esters, coconut oil and
en 60 as substrates. The principal changes in
erase activity were noted in the liver in cases
n obstructive jaundice, and in liver and plasma
er admin. of CCl_4. In both types of experi-
ts, there was a considerable decrease in the
sma-clearing-factor lipase.

2 EFFECTS OF VARIOUS ANAESTHETICS ON THE
METABOLISM AND GENERAL CONDITION OF THE
LATED PERFUSED RAT LIVER. (E.) Bloxam, D. L.
iv. Coll., London). Biochem. Pharmacol. 16(2):
-294, 1967.

ious anesthetics were added to the perfusion
ium of an isolated perfused rat liver prepara-
n and their effect on glucose and urea produc-
n was measured; the general condition of the
er was also assessed using the criteria of
er K levels, water content and bile secretion.
tobarbitone sodium, thiopentone sodium and
bromoethanol all caused a marked inhibition
glucose output, urea production and bile secre-
n from the liver. Halothane had relatively
tle effect on glucose and urea production at
erfusate conc. 15-20 times that present in the
od of rats under deep halothane anesthesia,
the effect was immediately reversed after
in. of the vapor was stopped. The criteria
oted also showed that it caused little or no
uctural damage to the liver at the same conc.
chloroethylene, at a perfusate conc. of approx.
imes that to be expected in the blood of an
sthetized rat, inhibited glucose and urea
out, and the loss of intracellular K and gain
water indicated that it caused extensive damage
the liver; therefore it is likely to be poten-
lly damaging in man. The liver K levels of
s kept under trichloroethylene anesthesia for
min. were slightly lower than those of rats
er halothane anesthesia for the same length
time. The production of liver necrosis by
ogenated hydrocarbons is discussed in the
ht of these findings.

3 ENZYMATIC BEHAVIOR IN EXPERIMENTAL
NOVOBIOCIN-INDUCED JAUNDICE. (It.)
ci, G. P. (U. Rome), G. Cucchi, A. De Arcangelis,
Rendace and A. Alessandrini. Epatologia 12(5):
-848, 1966.

er glucuronyl-transferase activity was studied
Sprague-Dawley rats treated immediately after
th with novobiocin (250 mg/kg/day in physio-
ical saline s.c.). Animals were kept under
ervation for 12-24 hr. and sacrificed several
after the appearance of jaundice. After re-
ing the livers, glucuronyl transferase activity
determined according to the Brown and Henning
hod, using orthoaminophenol or beta-methyl-
elliferon as glucuronide acceptors. Spectro-
tometric readings (wave length = 336 Å) were
formed immediately after the addition of
otinamide-adenine-dinucleotide (NAD). After
hr., novobiocin-treated rats showed wt. loss,
reduced liver vol., and jaundice especially in the proximal region of the tail as compared to untreated controls. With ortheaminophenol, glucuronide transferase activity was markedly lower in novobiocin-treated animals than in controls; with beta-methylumbelliferon, glucuronide transferase values were lower in treated rats than in controls, but not significantly so. Liver glycogen studies (Kemp method) gave variable results, but levels were generally lower than those observed in controls, an indication that liver glycogen reserves are also depleted. Results indicate that novobiocin inhibits liver glucuronyl transferase activity, necessary for the conjugation of bilirubin with glucuronic acid in the process of hepatic bilirubin formation. Since this inhibition occurs also in the liver of newborn animals in which the enzyme system is not completely developed, the authors recommend further studies with novobiocin to clarify some of the alterations found in congenital nonhemolytic jaundice.

9574 SERIAL MASSIVE HEPATIC RESECTIONS IN CIRRHOTIC RATS. CHANGES IN IN VITRO GROWTH OF LIVER CELLS. (E.) Hays, D. M. (Child. Hosp., Los Angeles, Calif.) and S. Okumura. J. Surg. Res. 7(6):270-275, 1967.

Fifty rats were inj. s.c. biweekly (for 11 wk.) for a total of 3 ml CCl_4 with weekly inj. vol. increasing with wt. (initial wt. 125 g; final wt. of 19 survivors, 365 g). Nine rats were sacrificed for sterile liver specimens at three 21-day intervals after completed regimen. Ten were subjected to 5 serial subtotal hepatic resections, beginning at the end of inj. and continuing at 3-wk. intervals for 12 wk. Another 120 rats were maintained on a standard diet until the age of 5 wk. and were than placed on a choline-deficient diet for 5 mo., during which time they received CCl_4 inj. (total 2.7 ml/rat) twice weekly for 17 wk., beginning 1 wk. after initiation of the new diet. Of these, 85 survived (av. wt. 325-375 g). From these, 70 controls (Group 1) were sacrificed and liver cells cultivated at 3-wk. intervals during and after the regimen. Others in this group were selected at random for 3 resection schedules (to assess in vitro cultivatability at different phases in the hepatotoxic process), each including 5 serial subtotal hepatic resections carried out at 21-day intervals. Group 2a included 10 in which resections began 2 wk. after initiation of hepatotoxic admin.; Group 2 b included 10 in which resection began at 16 wk.; Group 2c included 10 in which resections began 4 wk. after completion of the hepatotoxic regimen. A sixth resection was performed in Groups 2a and 2c 7 wk. after completion of regimen (after prolonged return to the normal diet). Livers from rats made cirrhotic by either regimen yielded cells with greater in vitro cultivatability than normal liver cells of rats of the same age. Rats with experimental cirrhosis, subjected to serial subtotal hepatic resection, yielded a further increase in cell proliferation when liver resections were begun during the actual hepatotoxic process. This increase was less marked that the accelerated in vitro proliferation occurring with cells from normal noncirrhotic rats after serial subtotal resection. Tissue from cirrhotic rats, subjected to resection after conclusion of hepatotoxic regimen, showed little increase in cultivatability.

9575 POSTOPERATIVE MASSIVE LIVER NECROSIS. A CLINICAL AND PATHOLOGICAL STUDY. (E.)

Babior, B. M. (Boston City Hosp., Mass.) and C. S. Davidson. New Eng. J. Med. 276(12):645-652, 1967.

The National Halothane Study made available for investigation 71 postoperative cases of autopsied massive liver necrosis. By clinical analysis these patients were classified into 2 groups, representing different types of liver necrosis. Independent "blind" analysis of liver histology yielded similar results. Agreement between the 2 modes of classification was almost complete. Fifty-six cases were classified as necrosis that followed vascular insufficiency due to severe shock, heart failure or both. Of these patients only 20% had jaundice. Cardiovascular insufficiency always preceded the jaundice. Although the lesions were extensive and severe, outlines of liver cells and cords were better preserved than in necrosis induced by drugs or virus. Of the 15 patients whose necrosis was not explained by vascular failure, 3 had hepatitis (assumed to be viral) before surgery, leaving 12 with no obvious cause for the liver disease. These 15 progressed rapidly from relatively good health through fever, jaundice and coma, to death ensuing within a wk. of the first symptoms. All but 2 (about 90%) were jaundiced. Hypotension appeared only terminally. The necrosis was indistinguishable morphologically from viral hepatitis, but because nearly all received halothane, it is suggested (but not proved) that this drug may also cause the lesion. Halothane was admin. to only 29.7% of the 800,000 patients in the National Study, and of the 59 whose liver necrosis could be explained by vascular insufficiency or preexisting hepatitis about the same figure, 33% received halothane. If halothane does cause massive liver necrosis, it does so rarely. Thus, histologic postoperative liver necrosis is most commonly associated with vascular insult, with few of the clinical findings of the better known but much less frequent acute yellow atrophy of assumed drug or viral etiology.

9576 EFFECT OF IN VIVO AND IN VITRO ETHANOL ADMINISTRATION ON LIVER LIPID PEROXIDATION. (E.)

Comporti, M. (U. Tennessee Med. Units, Memphis), A. Hartman and N. R. Di Luzio. Lab. Invest. 16(4):616-624, 1967.

Female Sprague-Dawley rats were fasted for 13 hr. before receiving, by p.o. intubation, either a single dose of 50% ethanol in the amount of
6 g/kg, or isocaloric glucose; the antioxidant
N,N'-diphenyl-p-phenylenediamine was admin. i.
as a corn oil suspension and given in the amou
of 60 mg/100 g at intervals of 48, 24 and 2 hr
before glucose or ethanol admin., while contro
received only corn oil i.p. The effect of in
or in vivo admin. of ethanol on liver peroxida
was estimated by the amount of malonaldehyde
formed by incubated liver homogenates. Ethano
increased lipid peroxidation 1-12 hr. after p.
intubation, but no difference was seen at 24 h
Enhancement of liver lipid peroxidation occurr
before increase in liver triglyceride conc., w
was seen at 2 hr. Ethanol-induced enhancement
liver triglyceride conc. was manifested throug
the 24-hr. experimental period. An increase
peroxidation of rat liver homogenates occurre
after addition of ethanol in vitro. When the
antioxidant N,N'-diphenyl-p-phenylenediamine w
admin. either in vivo or in vitro, lipid perox
tion was inhibited to a comparable degree in
presence or absence of ethanol. Liver trigly
accumulation in N,N'-diphenyl-p-phenylenediam
ethanol treated animals was markedly reduced,
when compared to the ethanol-treated group.
results support the previously proposed hypoth
of lipoperoxidation as a possible fundamental
mechanism of the acute ethanol-induced fatty
liver.

9577 TETRACYCLINE-INDUCED FATTY LIVER IN NONPREGNANT PATIENTS. A REPORT OF

CASES. (E.) Perers, R. L. (U. Southern Cali
Los Angeles), H. A. Edmondson, W. P. Mikkelse
and D. Tatter. Amer. J. Surg. 113(5):622-632
1967.

Autopsy material was examined from 6 nonpregn
women who had died unexpectedly after hospita
tion for a variety of medical and surgical co
tions. All 6 had received a substantial amou
of tetracycline i.v. (9-27 g). The liver of
these patients had undergone the foamy type o
fatty degeneration peculiar to tetracycline
toxicity. The most severe degeneration was i
the central 33-75% of each lobule and was see
as a fine, foamy vacuolization accompanied by
partial dissolution of intercellular membrane
Residual necrotic cells were rare but pigment
and cellular debris in Kupffer cells gave evi
of cellular death. All 6 patients had a hist
of nausea, vomiting and altered consciousness
some patients were feverish as well. These
conditions were usually seen after partial
recovery from the diseases which had required
hospitalization. The condition of 3 patients
deteriorated after tetracycline therapy. The
other 3 patients were already seriously ill w
such therapy was initiated. In the literatur
the deaths of nonpregnant patients with fatty
liver associated with tetracycline admin. can
be attributed to the antibiotic directly as a
patients were seriously ill at the time of
admin. In the present study, hepatic changes
were the major pathologic findings in 4 of th
patients and were accepted as the cause of de

hough clinical and laboratory evidence of
right hepatic failure was not significant.
um transaminase activity and bilirubin levels
3 of these patients were slightly elevated.
sma prothrombin activity was markedly depressed.
is concluded that in these 4 patients death
due to the effects of tetracycline.

78 THE EFFECT OF AGE, SEX AND VARIOUS
HORMONAL TREATMENTS ON THE LEVELS OF
LIVER PROCAINE ESTERASE IN VITRO. (Fr.)
deur, J. (U. Montreal, Canada), J. Y. Côte,
Nantel and P. Auger. Rev. Canad. Biol. 26(2):
-140, 1967.

e and female white rats (6-90 days old) were
led by decapitation, tissues rapidly excised,
ghed and homogenized in an appropriate vol. of
arbonate Krebs-Ringer soln. (pH 7.4). Hormones
e inj. s.c. (2 mg/kg body wt./day) for 21 days
corn oil. The activity of procaine esterase
measured in terms of 1 of the products, para-
nobenzoic acid determined colorimetrically.
U was 1 µg of paraaminobenzoic acid formed
10 mg of tissue in a period of 20 min. under
ndardized conditions from 0.3 ml of 3 x 10^{-3}
rocaine. The procaine esterase activity of
ney, lung, and testis was approx. 10% of that
the adult male liver (6.3 U). Brain, heart,
cle, skeleton and adrenal glands were incapable
hydrolyzing procaine. The liver activity was
sured in the normal rats from 6-90 days of age.
h male and female rats were inj. s.c. with
n oil only, testosterone, estradiol, progester-
, norethandrolone, cortisone, hydrocortisone,
deoxycorticosterone. Some male rats were
trated at 24 days and others at 60 days. Some
ales were ovariectomized. The LD_{50} of procaine
275 mg/kg in immature animals and 280 in adult
s (route not stated). Between 6 and 12 days
age procaine esterase activity was 0.6 U in
e livers and 1.0 U in the female; from days
2 the activity increased more rapidly in the
e than in the female in approx. rectilinear
ner, reaching 6.3 and 3.6 U, resp.; the activi-
s were apparently uniform between 60 and 90
s. Ovariectomy (5.3 U) and admin. of testoster-
(7.5 U in the male, 5.2 U in the female)
reased activity as did norethandrolone in the
ale (6.2) but not in the male. Castration at
days reduced procaine esterase activity to
and at 60 days to 5.1 U. Treatment of the
e with estradiol (3.3 U) or progesterone
6 U) reduced activity.

79 THE EFFECT OF CORTISONE, DEOXYCORTICO-
STERONE AND INSULIN ON FIBRINOGEN
MATION FUNCTION OF THE LIVER IN TOXIC DISEASES.
s.) Drobintseva, I. V. (1st Pavlov Med. Inst.,
ingrad, USSR). Probl. Endokr. 13(4):76-79, 1967.
7.

30 A SEVENTEEN YEAR OLD GIRL WITH FATTY
LIVER OF PREGNANCY FOLLOWING TETRACYCLINE
THERAPY. CLINICOPATHOLOGIC CONFERENCE. (E.)
Aach, R. and J. Kissane (Eds.) Amer. J. Med.
43(2):274-283, 1967.

9581 CHANGES IN THE LIPID CONTENT ON MATERNAL LIVER, FETAL LIVER, PLACENTA AND TOTAL FETUS OF THE RAT AFTER TOTAL BODY IRRADIATION WITH 800 R. (Ger.) Winkler, L. (Friedrich Schiller U., Jena, Germany). Acta Biol. Med. German. 18(4):457-464, 1967.

9582 ALCOHOL INDUCED DEPRESSION OF RETICULO-ENDOTHELIAL FUNCTION IN THE RAT. (E.) Ali, M. V. (Buffalo Sch. Med., N. Y.) and J. P. Nolan. J. Lab. Clin. Med. 70(2):295-301, 1967.

9583 CHOLESTATIC JAUNDICE ASSOCIATED WITH CHLORDIAZEPOXIDE HYDROCHLORIDE (LIBRIUM) THERAPY. REPORT OF A CASE AND REVIEW OF THE LITERATURE. (E.) Lo, K. J. (U. Washington Sch. Med., Seattle), I. R. Eastwood and S. Eidelman. Amer. J. Dig. Dis. 12(8):845-849, 1967.

9584 LIVER DISEASE DUE TO NITROFURANTOIN. (E.) Jokela, S. (Oulu U. Hosp., Finland). Gastroenterology 53(2):306-311, 1967.

9585 MORPHOLOGIC CHANGES OF THE LIVER LONG AFTER WHOLE-BODY PROTON IRRADIATION. (Rus.) Utoplov, V. T. Med. Radiol. (Moskva) 12(7):52-57, 1967.

9586 HEPATIC PROTEIN SYNTHESIS IN NORMAL AND ACETOXYCYCLOHEXIMIDE-TREATED RATS. (E.) Jondorf, W. R. (George Washington U. Sch. Med., Washington, D. C.), D. C. Simon and M. Avnimelech. Arch. Biochem. 121(1):202-210, 1967.

9587 GLUCOSE METABOLISM AND TREATMENT OF HEPATIC DISEASES BY STEROIDS. CLINICAL STUDY. (Fr.) De Groote, J. (St. Raphael U., Louvain, Belgium), J. Fevery and J. Vandenbrouchke. Acta Gastroent. Belg. 30(4):293-312, 1967.

9588 DEMONSTRATION OF COPPER AND ACID PHOSPHATASE ACTIVITY IN HEPATOCYTE LYSOSOMES IN EXPERIMENTAL COPPER TOXICITY. (E.) Goldfischer, S. (Albert Einstein Coll. Med., Bronx, N. Y.). Nature (London) 215(5096):74-75, 1967.

9589 CHRONIC CHOLESTASIS FOLLOWING PROLONGED TOLBUTAMIDE ADMINISTRATION ASSOCIATED WITH DESTRUCTIVE CHOLANGITIS AND CHOLANGIOLITIS. (E.) Gregory, D. H. (Minneapolis Veterans Hosp., Minn.), G. F. Zaki, G. A. Sarcosi and J. B. Carey, Jr. Arch. Path. (Chicago) 84(2):194-201, 1967.

9590 ENZYME BEHAVIOR IN HEPATIC CHANGES PRODUCED BY EXPERIMENTAL ANESTHESIA. (Sp.)(Rev.) Grau Sbert, A. (Fac. Pharm., Madrid). Rev. Esp. Anest. 14(2):139-168, 1967.

9591 LIVER CELL DAMAGE IN A GROUP OF SURGICAL PATIENTS. (Ger.) König, G. (U. Hosp., Hamburg-Eppendorf, Germany), G. Pliess and K. Schilling. Bruns Beitr. Klin. Chir. 214(4):465-480, 1967.

9592 THE EFFECT OF THERAPEUTIC DOSES OF CARBON TETRACHLORIDE ON LIVER AND KIDNEY FUNCTIONS IN SHEEP. (E.) Kamel, S. H. (Cario U.), M. A. Soliman and A. Farag. J. Egypt. Med. Ass. 49(11-12):739-745, 1967.

9593 DRUGS AS A CAUSE OF TOXIC LIVER DAMAGE (Ger.)(Rev.) Estler, C. J. (U. Erlangen-Nuremberg, Germany). Fortschr. Med. 85(13):549-554, 1967.

9594 MANIFESTATION OF TOXIC INVOLVEMENT OF THE LIVER BY A COMPLEX OF SUBSTANCES USED IN THE TECHNOLOGY OF SYNTHETIC RUBBER. (Ru Ivanova-Tikhvinskaia, E. L. (Iaroslav Med. Inst. USSR). Vrach. Delo (6):100-102, 1967.

9595 EFFECT OF SOME ANESTHETICS ON HEPATIC FUNCTION DURING OPERATION. (Fr.) Jordanov, J. (Fac. Med., Sofia), S. Baev and D. Dimitrov. Lyon Chir. 63(4):536-542, 1967.

AUTONOMIC NERVOUS LESIONS IN VIRAL HEPATITIS AND LIVER CIRRHOSIS. (E.)

lesco, S. (Inst. Med., Bucarest, Rumania).
Neuroveg. (Wien) 29(3):385-425, 1967.

natomical and clinical study of the right
ac ganglion in fatal viral hepatitis and
tic cirrhosis was made in 12 patients by com-
son of the clinical data and histopathology
he liver and the histopathology of the celiac
lion. The autonomic nerve lesions were studied
cially by means of Troitsky's silver block
egnation, and also by Bielschowsky's impreg-
on, Nissl's method, and other staining technics.
various autonomic lesions observed could be
idered to parallel the hepatic lesions and
r dynamics. The findings were minimal recent
nomic nerve cell lesions in viral hepatitis
child; reduced nervous lesions of the dys-
nic and irritative type in viral hepatitis in
ts with prevalent necrosis of the hepatic
s; intense autonomic nervous lesions in viral
titis associated with anterior gastritis pro-
es; various associated autonomic lesions of
acute and chronic type in recent necrotic
titis associated with older precirrhotic
ons; nervous lesions, especially of the
nic type with intense, ball phenomenon and
nological changes of the synapses in liver
nosis. The autonomic nervous lesions observed
nonspecific and their significance results
from the comparison with the dynamics of the
tic lesions, the clinical data, and the history.

PROBABLE POSTTRANSFUSION HEPATITIS DURING THE COURSE OF CIRRHOSIS. (E.)

ar, J. (Chicago Med. Sch., Ill.), B. Chomet,
. Korn and H. J. Zimmerman. Arch. Intern.
(Chicago) 120(2):193-201, 1967.

pisode of acute jaundice that was assumed to
esent posttransfusion hepatitis was observed
ach of 7 patients (all alcoholics; 5 males,
males; 33-64 yr. old) with an established
nosis of cirrhosis, 30-190 days after re-
ing 1 or more blood transfusions. In 1 pa-
t, no new subjective complaints were recorded;
he other 6, variable degrees of malaise, anor-
, nausea and epigastric fullness appeared
tively abruptly at the time of the acute epi-
. Jaundice was intense in 3 patients, with
rubin levels that ranged from 19-29 mg/100 ml;
patients it was moderate (7.7 and 11 mg/100
and in 2 it was slight (4.7 and 5.0 mg/100 ml).
patients died during the acute episode of
umptive hepatitis; of the 5 who recovered
the acute episode of jaundice, 2 died 7 and
o. later, apparently from cirrhosis. In
7 patients there was a marked rise of SGOT
es between 500-1000 U during the episode of
dice; in 5 patients who had both SGOT and SGPT
rminations, the SGPT value, although elevated,
less increased than SGOT. The thymol turbidity
es rose appreciably in 5 of 7 patients, from
previously normal or slightly elevated values, to more markedly abnormal levels. In 4 patients, the alkaline phosphatase value was higher during the episode of presumed hepatitis than it had been on previous occasions. Histologic abnormalities during the bout of jaundice consisted of the obvious cirrhosis with varying degrees of acute parenchymal degenerative change, inflammation and focal areas of necrosis; free hyaline bodies were seen in only 2 patients; 1 of them also had more extensive hepatic necrosis than the other patients who were studied during the episode of presumptive hepatitis. Another patient who died during the acute episode of presumptive hepatitis had no more extensive necrosis than that of the patients who survived. In general, parenchymal abnormalities and inflammation observed during or after the episode of jaundice were qualitatively similar to those observed in the earlier biopsies, although somewhat more severe. On the basis of these cases, it is suggested that viral hepatitis of the serum variety may occur in patients with established cirrhosis, and that these instances can be recognized from biochemical data and suspected from the clinical data.

9598 BILIRUBIN AND GLUCURONIC ACID CONTENT IN SPINAL FLUID OF PATIENTS WITH VIRAL HEPATITIS. (It.)

Maddaluno, R. (U. Rome). Epatologia 12(5):849-863, 1966.

Bilirubin and glucuronic acid levels were determined in the serum and spinal fluid of 20 male patients (age 14-63 yr.) with viral hepatitis and 8 normal male subjects (age 8-48 yr.). Bilirubin levels were determined by spectrophotometry and ranged from 12-40 mg% (av. 22.9 mg%) in the serum of hepatitis patients as compared to 0.1-1.15 mg% (av. 0.47 mg%) in the serum of normal subjects; in hepatitis patients, direct serum bilirubin levels ranged from 6-30 mg% (av. 10.5 mg%) and indirect serum bilirubin ranged from 2-15 mg% (av. 7.4 mg%); in normal subjects, indirect bilirubin levels were slightly higher than direct bilirubin levels in all cases. Bilirubin was not present in the spinal fluid of normal subjects. Total bilirubin content in the spinal fluid of hepatitis patients ranged from 0.15-0.97 mg% (av. 0.41 mg%); direct bilirubin content ranged from 0.1-0.7 mg% (av. 0.29 mg%); indirect bilirubin was present in only 13 of 20 patients, av. content 0.17 mg%. In normal subjects, av. glucuronic acid content (Fishman method) of the serum and spinal fluid was 2.57 mg% and 2.28 mg%, resp. Glucuronic acid content was much higher in the serum and spinal fluid of hepatitis patients, av. levels being 5.5 mg% and 4.93 mg%, resp. Results indicate high serum bilirubin levels in persons with high serum glucuronic acid levels. Patients with high spinal fluid levels of glucuronic acid also showed high spinal fluid levels of bilirubin. The authors concluded that the presence of bilirubin in the spinal fluid is due to direct passage across the blood-spinal fluid barrier.

9599 IDIOPATHIC NEONATAL HEPATITIS: DISCORDANCE IN MONOZYGOTIC TWINS. (E.)

Lough, J. (McGill U., Montreal, Canada) and J. D. Metrakos. Canad. Med. Ass. J. 96(18):1258-1261, 1967.

Two pairs of monozygotic twins, discordant for idiopathic neonatal hepatitis, are described. In the first pair, both were born slightly jaundiced; 1 was discharged because of the transient nature of the jaundice. The other was admitted at 8 days and later discharged when the bilirubin level decreased to 7.8 mg%; he was readmitted at 3 mo., and at laparotomy the bile ducts were normal and patent; liver biopsy showed multinucleated cells, scattered areas of necrosis, large pale liver cells, and bile thrombi consistent with neonatal hepatitis. The bilirubin level continued to decline without treatment. At 16 mo. he was operated on for repair of a large right inguinal hernia. The jaundice at this time had cleared completely and the total bilirubin was 0.25 mg%. He was entirely well when last seen at 15 yr. In the second pair, 1 was born well. The other was admitted at 7 wk. because of progressive jaundice since 5 days of age, associated with pale stools and dark urine. Open liver biopsy and operative cholangiography showed a patent biliary tree. Biopsy showed giant cell transformation, extensive hematopoiesis, bile stasis in hepatic cells, and canaliculi consistent with neonatal hepatitis. She was readmitted at 8.5 mo., after 6 mo. of steroid therapy in another study, and appeared healthy and nonjaundiced. A follow-up needle biopsy showed minimal changes of neonatal hepatitis and a third biopsy was entirely normal. All liver function tests were normal at 15 mo., and steroids were discontinued. She was well when last seen at 4.5 yr. of age. Family histories of both pairs were noncontributory, with no history of liver disease in near relatives. There was no consanguinity in either family. There was at least a 97% chance that each of the pairs was monozygotic. The discordance is evidence against viral infection acquired prenatally as the primary cause of idiopathic neonatal hepatitis. Immaturity of the intracellular bilirubin excretory pathoway is suggested as a cause of this disease.

9600 ACTIVITY OF ALDOLASE, PHOSPHOHEXOISOMERASE AND ALKALINE PHOSPHATASE IN THE SALIVA AND BLOOD OF PATIENTS AFFECTED WITH EPIDEMIC HEPATITIS. (Rus.)

Daragan, V. G. (Lugansk City Hosp., USSR), L. K. Popova, N. U. Petrischeva and V. S. Paranich. Klin. Med. (Moskva) 45(3):76-79, 1967.

In 20 healthy controls, aldolase ranged from 2.0-10.0 (av. 6.0) conventional U in the blood, and 2.0-8.0 (av. 5.0) in saliva; phosphohexoseisomerase was absent, but alkaline phosphatase ranged from 0.4-4.0 (av. 4.0) Bodansky U in blood, and 0.4-5.0 (av. 4.5) in saliva. In 58 patients with viral hepatitis, the range of values for blood and salivary aldolase was 10 conventional U or
less in 8 and 22 subjects, resp.; 11-20 conver
tional U in 28 and 23 subjects; 21-30 conventi
U in 17 and 8; and 31-40 conventional U in 5 s
jects for both blood and saliva. Therefore,
during an attack of viral hepatitis, salivary
aldolase apparently increases somewhat later t
that of blood. During recovery, blood aldolas
decreased to normal in 16 of 22 subjects, whil
salivary aldolase remained significantly highe
than normal; during recovery, such liver funct
tests as bilirubin, thymol turbidity, mercuric
chloride, and the Takata-Ara and Weltmann reac
tions returned to normal earlier than salivary
aldolase. Alkaline phosphatase was normal in
both blood and saliva for all but 1 of 15 pat
with viral hepatitis with a severe form of the
disease, whose blood alkaline phoaphatase increased to 50 U, but whose salivary enzyme was
normal. Blood phosphohexoseisomerase activity
was slightly elevated in only 5 of the 58 pat
but this enzyme, independently of the time and
severity of the disease, was absent in saliva

9601 RHEOHEPATOGRAPHY IN THE ASSESSMENT
THE DYNAMICS OF ACUTE AND RESTORATI
PERIODS OF INFECTIOUS HEPATITIS. (Rus.)

Kirzhner, L. S. (Inst. Virusol., Acad. Med. S
Moscow). Klin. Med. (Moskva) 45(3):86-91, 19

The instrument was connected to a 2-channel
electrocardiograph, and the following paramet
were defined: QX, the rheographic index; TA,
max. amplitude; QY, time periods; and TA/AY,
elasticity of the vascular wall (which av. 1.
normals, with a range of 0.9-1.1). In most o
the 116 patients (63 men, 53 women; most of w
were 15-40 yr. old) with viral hepatitis (mil
form, 68; moderately-severe form, 39; prolong
form, 7), the hepatic blood circulation was d
turbed during the entire period of hospitaliz
especially in patients with a prolonged form
the disease. Changes in the rheohepatogram d
the first wk. of jaundice included a decrease
in amplitude of the curve with a reduced rheo
graphic index; this was found in 86.2% of the
patients and was maintained in 92.3% of these
during convalescence. The QX segment during
acute period was at the upper limits of norma
or was increased to 0.14-0.16 sec. (in 15 hea
normals it was 0.06-0.12 sec.); the TA segmen
was decreased, but rarely was reduced below t
lower limit of normal. Segment QY was decrea
and reached 0.42-0.44 sec. (in healthy normal
it was 0.44-0.54 sec.); if it was low in the
first wk. of jaundice, it became normalized a
the time of recovery. In 10-12% of the patie
segment QY could not be determined. The stre
coefficient (TA/AY) during the initial jaundi
period was less than 0.9, and at recovery it
mained low in 40% of the patients (it was 1.0
normal individuals). In 11 of 116 the rheohepatogram was normal at the time of hospital
tion for the disease, and abnormal at release
5 it was normal during the entire period of o
servation. Consequently, the rheohepatogram
normalized at time of release in only 9 (7.7%

patients. Three mo. after release, 41 of 84
ents were considered cured, and 26 of the 41
a normal rheohepatogram. Only 1 of 43 pa-
ts with an incomplete cure had a normal rheo-
atogram. At 6 mo. after release, 70 of 84 pa-
ts were cured, and 64 of 70 had normal rheo-
hic indices; the rheohepatogram remained ab-
al in all of 14 convalescents with an in-
lete cure (7 of the 14 had a prolonged form
he disease). In all outpatients, the bili-
n, aldolase, transaminase and mercuric chloride
results were normal. Two of 7 patients with
olonged form of the disease were rehospitalized
residual symptoms. Rheohepatography is recom-
ded for use both in special situations and in
hospital in order to facilitate better observa-
of convalescents. Two case histories are
ented in detail.

2 THE SIGNIFICANCE OF SERUM AMMONIA LEVELS IN EPIDEMIC HEPATITIS. (Rus.)

, M. V. (Leningrad Pediat. Med. Inst., USSR).
. Med. (Moskva) 45(3):79-85, 1967.

d ammonia and glutamine were determined in
ealthy subjects and in 166 patients (pre-
nantly women; 15-65 yr. old) with viral
titis (28 of whom had a mild form of the
ase; 106, a moderately-severe form and 32 a
re form). The ammonia conc. in healthy sub-
s ranged from 0.02-0.06 mg% and from 0.025-
mg% in viral hepatitis patients. The am-
a content was dependent upon the severity of
disease and the length of time the patient
hepatitis. A normal ammonia conc. was found
ost patients with a mild form of the disease,
4% of the moderately-severe cases at the peak
he disease, and in 43% with severe hepatitis.
highest ammonia conc. (up to 0.36 mg%) was
d in 13 patients with hepatic coma, 11 of
died. In several of the severe cases, the
nia conc. returned to normal at termination
he disease, while in 8% of the mild-moderately
re cases, the ammonia conc., was somewhat
ated (up to 0.07-0.10 mg%); this paralleled
erbation of the disease and increase in
dice. In most cases, the ammonia level was
alized during convalescence; the ammonia level
what exceeded normal in several cases with a
nic, periodic form of the disease. The in-
sed ammonia content during convalescence could
icate that the pathologic process in the liver
not completely terminated. The serum glut-
e content in healthy individuals varied from
-2.3 mg%. The glutamine content in those with
ild form of the disease fluctuated from 1.8-
mg% in 62.5% of the patients who had a normal
nia conc.; increase in ammonia conc. generally
alleled an increase in the glutamine level.
s pattern was also found in moderately-severe
acute forms of the disease. In 50% of those
a chronic and protracted form of the disease,
increase in ammonia conc. was not accompanied
an increase in glutamine conc. A parallel
rease in both ammonia and glutamine occurred
st frequently among those with severe disease.
During convalescence, the glutamine conc. either increased or reduced, signifying either synthesis or utilization of glutamine. Exacerbation was usually accompanied by an increase in the ammonia level (in all 7 cases) and a simultaneous increase in the conc. of glutamine (6 of 7 cases). Ammonia metabolism was most disturbed in 13 patients with hepatic coma, who had a high serum ammonia from 0.12-0.36 mg%. The ammonia conc. increased most frequently in fatal cases, and decreased with recovery. The glutamine conc. usually did not increase as much as did ammonia. Study of 54 patients with obstructive jaundice revealed an ammonia level of 0.03-0.10 mg%. In patients with cholecystitis and cholelithiasis, abatement of the disease process and decrease of jaundice was not accompanied by a change in ammonia conc. There was no increase in the ammonia conc. in patients with malignancy during the progressive exacerbation of this condition. The glutamine conc. ranged from 1.875-2.700 mg%, and did not always parallel the ammonia conc. Thus, a certain specificity of the changes in ammonia and glutamine conc. in blood occurs in viral hepatitis, in contrast to jaundices of other etiology. Three cases histories are presented in detail.

9603 THE BIOLOGICAL IMPLICATIONS OF THE HOYT-MORRISON REACTION. IDENTIFICATION OF AN AGGLUTINATING GAMMA-GLOBULIN. (It.)

Ortona, L. (Sacred Heart Catholic U., Rome), A. Barbarino and L. Quintiliani. Boll. Ist. Sieroter. Milan. 45(11-12):571-576, 1966.

Sera from 3 patients with viral hepatitis and positive Hoyt-Morrison test reactions of 1:64, 1:64 and 1:32, resp., were fractionated on a cellulose column and subjected to immunoelectrophoresis on agar gel and double immunodiffusion, as well as the original Hoyt-Morrison technic. In all 3 cases, the Hoyt-Morrison reaction was demonstrable in serum fractions containing γ-G globulins and was not demonstrable in any other fraction or combination of fractions, including γ-M.

9604 THE ROLE OF HEMAGGLUTINATING ANTIBODY ACTIVITY IN POST-HEPATITIS PATHOLOGY.

(It.) Balsano, F. (U. Palermo, Italy), G. Pitucco, L. Salerno, E. Cucchiara and A. Musca. Boll. Soc. Ital. Biol. Sper. 42(24):1880-1882, 1966.

Following apparent recovery from acute viral hepatitis, a number of patients in whom the Hoyt-Morrison hemagglutination test became positive during the period of elevated serum transaminase levels required 2-4 mo. for normalization of the test. In still others, the test remained positive for observation periods of more than 6 mo., during which they developed chronic or recurrent, presumably nonviral, hepatitis accompanied by structural damage to the liver. In all of these cases, as in a corollary study employing monkeys, the degree of positiveness increased sharply after each "cytolytic wave" reflected by increased serum transaminase levels, suggesting that the abnormal antibody activity followed necrotic liver damage, rather than preceding it. Accordingly, it is suggested that the same agent may be responsible for the "cytolytic wave" in question, whether it occurs in the presence of viral hepatitis or as part of a post-hepatitis syndrome which induces additional liver damage.

9605 THE VALUE OF γ-GLOBULIN PROPHYLAXIS IN THE CONTROL OF HEPATITIS. (Ger.)

Renger, F. (Carl Gustav Carus Med. Acad., Dresden, Germany) and A. Bley. Z. Ges. Hyg. 13(2):138-142, 1967.

Human γ-globulin was obtained from donor and placental blood; antibodies were conc. 10-fold during fractionation; that obtained from donors (about 3000) presented a polyvalent preparation with a high titer of immune bodies. This, briefly, was the procedure in the preparation of γ-globulin used in Eastern European countries to immunize 300,000 children. The incidence of hepatitis had previously been about 78.5/1000. Among those immunized the av. incidence was 18/1000. Similar reports are given with respect to other pathologies against which immune bodies are present in the γ-globulin fraction. The risk of transfusion hepatitis was reduced from 2.5-3.4% (2-5 transfusions) and 7% (more than 10 transfusions). The percent reduction (difficult to compute) was at least 50% in the fewer earlier transfusions and with no increased risk in additional later transfusions. Furthermore, among those treated with γ-globulin who still contracted hepatitis, the disease was anicteric, mild and of a shorter duration. The i.v. dose of γ-globulin for prophylaxis was 0.02-0.04 ml/kg. When danger of infection is great 0.04-0.12 ml/kg is inj. i.v. A second inj. 6 mo. later again restored passive immunity.

9606 TREATMENT OF PROTRACTED CONTINUING HEPATITIS IN AMBULATORY PATIENTS.

(Ger.) Krosch, H. (Martin Luther U., Halle-Wittenberg, Germany) and W. Teichmann. Deutsch. Z. Verdau. Stoffwechselkr. 26(5-6):222-228, 1966.

The continued care of ambulatory hepatitis cases presents a difficulty much appreciated by workers in this field: The accurate, or even fairly accurate, assessment of the current state of a protracted case by means of clinical and routine laboratory tests is problematical. Liver biopsies, the one basic test, cannot be taken as often as needed. One requirement, not well met at present, is the ability to recognize relapses early. Of 230 hepatitis cases followed during hospital treatment of at least 6 wk., and ambulatory control up to 2 yr. with a group of chemical tests chosen as the most indicative. These tests, the number of patients in the group who showed increased values, and the % of the group were: 1) SGOT, 140 (61%); 2) SGPT, 103 (45%); 3) thymol test, 93 (40%); 4) serum bilirubin, 40 (17%);
5) no increase in the values in any of these t
55 (24%). Although these tests were admin. ev
10 days for at least 90 days to each patient,
55 or 24% showed no increase in values even ir
the early stages. However, some patients with
elevated values in all 4 tests furnished resul
for analysis of these factors during the entir
course of the disease. Increases in serum bil
rubin and the thymol test occurred sharply wit
the first 10 days, the latter reflecting in-
creased γ-globulin conc. SGPT reached a peak
20-30 days and SGOT in 30-40 days; the serum
transaminase levels declined gradually, reachi
normal values between 60 and 90 days. The dec
in serum bilirubin and thymol were much more
abrupt. Three cases were individually plottec
a graph during 90 days after onset of the dise
In 1 instance, the thymol test showed a small
distinct peak on the twentieth day followed ir
5 days by a rise in SGOT and SGPT, both reachi
a peak at 40 days (a total rise for each of ab
160 U). These secondary peaks represented a
relapse. Another case showed a small peak in
the thymol test (still abnormally elevated) at
40 days; although the thymol test declined, th
slope was slight; SGOT and SGPT had fallen to
normal values (below 40 and 30 U) at 30 days,
their values began to turn upward with increas
slope; this patient was in transition to chron
hepatitis.

9607 QUANTITATIVE DETERMINATION OF CONJUG BILE ACIDS IN SERUM ACUTE HEPATITIS.

(E.) Frosch, B. (U. Heidelberg, Germany) and
H. Wagener. Nature (London) 213(5074):404-40
1967.

After extraction of serum with hot ethanol, th
bulk of the lipids was removed by distributior
ether, ethanol, heptane and water. Conjugatec
bile acids were separated by thin-layer chroma
raphy. This simultaneously removed bilirubin
and the remaining lipids from the bile acid sp
Quantitative determinations of the different c
jugates were made, in the presence of silica g
with sulfuric acid, salicylic aldehyde, sulfur
acid and acetic acid, and ethyl acetate, aceti
acid anhydride and sulfuric acid. Added pure
conjugated bile acids were recovered at approx
100% levels; sensitivity was 0.5 µg/ml serum.
this method serum from normals contained no co
jugated bile acid. Alterations in serum conju
bile acid were studied in a case of acute hepa
titis, with an interval of 8 days between the
of jaundice and the first determination of bil
acids. Initially there was a considerable in-
crease in most conjugates caused mainly by in-
creased conc. of taurochenodeoxycholic acid ar
glycochenodeoxycholic acid. The initial value
the total conjugated bile acid was 330 µg/ml
serum; final value, 40 µg/ml. Alterations in
conc. of serum bile acid were accompanied by
similar alterations of conc. of serum bilirubi
and serum enzyme. The latter were normal at t
end of observation, although bile acids were s
elevated. These observations were confirmed i

:hers with acute hepatitis. Conc. of total
n conjugated bile acid after normalization of
rubin and transaminases were 12-130 µg/ml
n. Liver biopsy specimens of these cases still
ed histological abnormalities. It is con-
ed that determination of conjugated bile
in serum during the course of liver disease
uperior to other tests of abnormal liver cell
:ion.

DIAGNOSIS AND CLINICAL PICTURE OF
ANICTERIC FORMS AND FORMES FRUSTES OF
EMIC HEPATITIS IN TUBERCULOUS PATIENTS. (Rus.)
erman, A. M. (Min. Health, Moldavian SSR,
inev). Ter. Arkh. 39(1)63-66, 1967.

ng the period 1961-1964, of 130 patients with
ve pulmonary tuberculosis and viral hepatitis,
16, more than 35 yr. old) had the exhausted
nicteric form and 48 had the pronounced icteric
of hepatitis; 482 tubercular patients with no
r pathology served as the controls. Clinical
toms, present in 67 of 82 patients, lasted
than 10 days in 12 persons and 11 days-2 mo.
5. A slight increase in serum bilirubin (more
1 mg%) was found in 72 of 82; of these, 66
the direct reaction for bilirubin. Aldolase
vity was normal in 7 of 80 patients, slightly
eased (9-15 U) in 30 of 80, and significantly
eased in approx. 50%of the patients. The
reliable test for differential diagnosis was
rmination of SGPT activity; this was increased
ll of the patients (to mostly more than 100-
U) and 53 of 60 patients tested had an in-
sed activity of SGOT. The least reliable
s (due to alterations among the control sub-
s) included the Takata-Ara reaction, which
positive in two-thirds of the patients; the
min-globulin index, which was less than 1 in
of the patients; and reduced excretion of
uric acid (after admin. of sodium benzoate)
3% of the patients. RBC were increased in
atients, and a decreased RBC sedimentation
was found in 36 persons. In 49 of 82 patients
illness was of a chronic nature, and normaliza-
of biochemical indices occurred after 6 wk.;
e was no normalization in 32 patients. The
difficult differential diagnosis was found
ases of toxic-allergic liver reactions develop-
from admin. of antitubercular agents.

SERUM FREE FATTY ACIDS IN CHILDREN
WITH VIRAL HEPATITIS. (Ger.) Spahn, U.
Child. Clin., Jena, Germany). Klin. Wschr.
0):530-533, 1967.

m free fatty acids were determined in 26
dren (2-9 yr.-old) with viral hepatitis after
-hr. fast for a total of 133 titrimetric
urements; 16 of these children had at the
t of the disease been placed on a liver diet
in fat, but rich in carbohydrate and protein.
addition of fat to the diet usually occurred
he twenty-eight stationary treatment. The
r 10 were fed on a slightly modified normal diet which from the beginning contained butter fat. The patients had mild to moderately-severe cases of the disease; 3 had anicteric courses. Among the clinical symptoms, and as liver enlargement; jaundice (range of serum bilirubin, 1.51-6.67 mg%) and bilirubinuria, which most of the children had, were the anicteric, inexplicable, greatly increased transaminase values (SGPT above 800 U). Children (12) with nonhepatic disorders such as diabetes, and adiposity comprised the controls. From the outset there were no significant differences in the serum free fatty acid values between those on the liver diet and those on the diet containing fat. A significant difference did exist between those with hepatitis and those without hepatitis at the beginning. By the twentieth day of treatment the difference between the hepatitis and nonhepatitis patients was no longer significant; the serum free fatty acid conc. had decreased in the hepatitis patients, and began to approach the normal values. On the twenty-first day of treatment the serum values were practically normal. At this time the transaminase levels, which had been high, also had fallen to the normal range. The decrease in serum free fatty acid conc. and the fall in serum transaminase levels are parallel in children recovering from viral hepatitis.

9610 EXPANSION OF THE DIET IN BOTKIN'S DISEASE IN CHILDREN. (Rus.) Kuzntsova, S. V. (Odessa Med. Inst., USSR). Pediatriia 46(3):69-72, 1967.

A total of 282 children (1-16 yr. old) with viral hepatitis (milk form, 209; moderately severe, 59; severe, 14) were treated with either Diet Number 5 (Group 1, 200 children; this consisted of 38-82 g protein, 20-50 g fats, and 250-500 g carbohydrates, for a total of 1322-2778 calories, depending upon age) or the expanded diet (Group 2, 82 children; this consisted of 50-95 g protein, 50-90 g fats and 230-450 g carbohydrates, for a total of 1540-2990 calories, depending upon age); the latter did not exacerbate the clinical course of the disease and biochemical indices were the same as in controls. In Group 2 the appetite, although improved, was diminished for a prolonged period of time in 27 patients. In Group 1, the av. duration of jaundice was 10.3 days for the mild form of the disease, and 24.3 days for the moderately-severe form; values for Group 2 patients were 10.7 and 22.7 days, resp. An increase in wt. was found in 87% of the Group 1 children and in 75% of those in Group 2. Pyoderma occurred in 12% of those in Group 1 and in 3.6% of those in Group 2; intercurrent diseases were found in 12% of Group 1 children and 14% of those in Group 2, while residual symptoms were found in 75.5% and 59.8%, resp. The β-lipoprotein level in Group 2 was increased during period 1 of the disease (at admission); it decreased slightly during period 2 (second wk. of jaundice) and continued to normalize during period 3 (at release); however, in most of the patients it was still above normal values (above 35 U). A similar pattern of β-lipoprotein conc. was also noted in Group 1. In Group 2, cholesterol was increased (180-250 mg%) in 70.5% of the children during Period 1 and in 64.7% during Period 2; in Group 1, cholesterol was decreased (less than 120 mg%) in 56.6% and 50.3%, resp. (normal values were 120-170 mg%). Hypercholesteremia (more than 250 mg%) was found in a similar number of patients in both groups. The differences which have been noted occurred chiefly in the mild form of the disease. At release, abnormal cholesterol conc. were found in 40.8% of those in Group 2 and in 44.4% of those in Group 1. Hyperlipidemia (greater than 850 mg%) in Group 2 was found in 25 of 58 children during Period 1 of the disease, in 11 of 49 during Period 2 and in none of 55 during Period 3; in Group 1, hyperlipidemia was found in 37% of the children during Period 1 of the disease, in 21.3% during Period 2 and in only 2 children during Period 3.

9611 SIGNIFICANCE OF HUMAN SERUM TRANSFUSION IN VIRAL HEPATITIS TRANSMISSION. (Rus.) Pille, E. R. (Sanit.-Epidem. Station, Leningrad, USSR), F. G. Itselis and M. N. Kulakova. *Zh. Mikrobiol*. 44(2):108-111, 1967.

Antiinfluenza serum (amount used indicated in brackets) from donors who previously had influenza was given to 8106 adults and children (162,765 ml) in 1963, to 12,585 (255,750 ml) in 1964 and to 3443 (83,615 ml) in 1965. No correlation between the morbidity of hepatitis and the use of antiinfluenza serum was found until 1963, at which time, during April-June, cases were registered among the recipients of Serum Series Number 2364. This serum was given to 28 children, of whom 10 (35.7%) had the icteric form of hepatitis; however, the real morbidity may have been greater. Among adults, only 1 case of hepatitis could be definitely recorded for this serum; another 2 cases among adults may not have received this serum. Chronic cholecystitis was diagnosed in 1 of 15 donors several mo. after blood donation. It is thus possible that this person had the anicteric form of hepatitis and became the source of infection. During the period August, 1964-January, 1966, 796 patients were hospitalized for hepatitis, and 328 (188 adults, 140 children) of these had previously received antiinfluenza serum. An anamnesis obtained in 252 of 328 (145 adults, 107 children) patients showed that 13 children (up to 7 yr. of age) and 5 adults (over 50 yr. old) had received antiinfluenza serum 2-6 mo. before the onset of the disease. However, analyses of this serum revealed no association between these infections and inoculation of this serum. Simultaneously, 11 of 18 patients received blood and plasma, and this could possibly have been the source of infection. It is concluded that, with the present methods of donor investigation, the risks of serum hepatitis are not great, but cannot be completely excluded.

9612 EPIDEMIOLOGY OF VIRAL HEPATITIS. (Ger.) Červenka, J. (Epidem. Microbiol. Res.
Inst., Bratislava, Czechoslovakia). *Z. Ges.*
13(2):133-138, 1967.

The incidence for the 9-yr. period 1957-1965
235/100,000. The max. morbidity in the Czech
regions was in the 7- and 8-yr. age groups,
whereas in the Slovak regions it occurred in
the 5- and 6-yr. bracket. Max. morbidity occ
in November for individuals up to the age of
There was no special seasonal incidence of he
titis in those older than 30. For the whole
country the incidence in first-yr. group was
approx. 1/1000, rising to 8/1000 at 8 yr., th
falling to 6/1000 at 12 yr., to 2/1000 at 24
and to 1/1000 at 50 yr.

9613 EXPERIENCES WITH RAPID ENZYME TESTS
THE EARLY DETERMINATION AND EPIDEMI
CONTROL OF VIRAL HEPATITIS. (Ger.) Woratz,
(Annaberg Hosp., Germany), F. Hajduk and P. Mi
Z. Ges. Hyg. 13(2):143-147, 1967.

In a group of 2000, 87 persons became ill wit
hepatitis during a period of 6 mo. Screening
tests, the determination of 3-4 serum enzymes
were instituted when 60 had developed symptom
of hepatitis. Routinely SGPT, fructose-1,6-d
phosphatealdolase (ALD) and LDH were determin
by the rapid color tests. The speed with whi
ALD rose as infection began and the parallel
changes in the enzyme level with the course o
icteric hepatitis made this test especially u
ful. Screening children in a school with onl
2 tests, 89 were found to have increased seru
enzyme levels; 12 showed an increase in SGPT
well as ALD, 77 showed only an increase in th
latter; of the whole group (89, ALD-positive)
some had a mild course of hepatitis generally
indicated by lesser serum elevation of ALD an
others had a more severe course. It is signif
that the ALD test was sensitive enough to differentiate mild anicteric cases. Graphing th
courses of ALD and LDH tests for an identical
group of 22 subjects for a total of 6.5 wk. s
a gradually decreasing serum conc. of ALD in
latter half of the interval with only 2 mildl
erratic courses, whereas the serum conc. of L
in more than 50% of the cases rose in the lat
half of the interval to exceed previous peak
values.

9614 USE OF MODERN SCREENING TESTS IN THE
EPIDEMIOLOGIC CONTROL OF HEPATITIS.
(Ger.) Anders, G. (Humboldt U., Berlin) and
C. Wagenknecht. *Z. Ges. Hyg*. 13(2):131-133,

The technic involved in these tests (determin
of serum enzyme levels) has been described in
previous paper. The rapid color tests are us
because they are inexpensive, rapid, require
simple apparatus, can be used in the field by
persons with little training and are so devis
that its sensitivity is greatest in the regio
of slightly increased enzymatic activity. Th
sensitivity is of the order of that of the

rophotometer. The tests were first employed
hepatitis epidemic to screen the people in
llages and 4 collectives; in addition, all per-
in contact with cases of the illness were
ed 2 times/wk. for 3 wk. Almost 10,000 enzyme
rminations were made on 2820 persons, 116 cases
e disease were discovered; these were ex-
ed clinically and all had hepatitis. This
ted to 4.1% of those examined; their dis-
tion was 5 in the early stages of jaundice,
closed by SGOT and by LDH, 1 by SGOT only and
LDH only; of 25 in the early anicteric stage,
re diagnosed by SGOT and LDH, and 10 by SGOT
78 in an anicteric course, 8 by SGOT and
2 by SGOT only, and 68 by LDH only; 4 not
d, 2 by SGOT and LDH, 2 by SGOT only; of 4
chronic hepatitis, 2 were diagnosed by both
by LDH only. Of 9558 persons tested, 140
positive by the rapid color tests or an in-
ce of 1.5%. Among these, the disease took
icteric course in 69.4% of the cases. All
ns with elevated serum enzyme conc. in these
should immediately undergo a medical examina-
These enzyme color tests are sufficiently
ostic for screening tests.

THE EPIDEMIOLOGY OF EPIDEMIC HEPATITIS.
(Rus.) Skolubovich, G. V. (Blagovesh-
k Med. Inst., USSR). Zh. Mikrobiol. 44(2):
34, 1967.

1955-1964 standard epidemiological studies
carried out on 1570 foci of viral hepatitis;
clinical-laboratory and epidemiological
nations were performed on 250 foci for 2-12
Healthy contacts (more than 2800) were either
ned daily or no less than 2 or 3 times/wk.
al of 220 patients with the "fruste" and
eric forms of hepatitis were isolated during
nitial 3-5 days after onset of the disease;
days before the appearance of jaundice, 178
nts were isolated. During an observation
d of 2 mo. 70 patients were found with the
te" form of hepatitis; in a 3-mo. observation
d 81 were found, in 6 mo., 51 and in 12 mo.,
In a control group (1570 foci) examined once
7-10 days, usually only patients with
lice were detected. Approx. 20% of 220 pa-
s with the "fruste" form of hepatitis were
ource of infection in healthy persons, and
ersons were infected from 32 patients with
nicteric form. In the foci observed by the
r, 48% of the patients had the "fruste"
of hepatitis, but in Leningrad this percentage
ot exceed 6. The incidence in Sakhalin and
was no better. This showed that many pa-
s with the anicteric or "fruste" form of
itis remained undetected, and this is one
e essential causes of the high morbidity in
hepatitis. A study of patient infection
ases of the disease showed that in the last
days of the incubation period they were the
e for (actual) contact and parenteral in-
ion. It was additionally discovered that
nts with the "fruste" form in whom the pro-
had a lingering chronic course with periodic
exacerbations were a source of infection. Under the activity of γ-globulin the "fruste" form of hepatitis appeared in persons infected by contact, and these could be the source for further infection.

9616 LYSOSOMAL INJURY IN MURINE VIRAL HEPATITIS. (E.) Datta, D. V. (Harvard Med. Sch., Boston, Mass.), W. A. Jones and K. J. Isselbacher. Gastroenterology 52(5):828-836, 1967.

Studies on the role of lysosomal injury in the initiation and propagation of hepatic cell necrosis have given inconsistent results, although concurrent lysosomal injury and hepatic cell damage has been demonstrated. In evaluating the occurrence of lysosomal damage and its possible role in the production of hepatic cell necrosis in viral hepatitis the authors iniated an anatomical, histochemical and biochemical study using the MHVS strain of virus. It was shown that lysosomal enzyme alteration may be detected as early as 24 hr. following MHVS infection, before hepatic necrosis could be observed by light microscopy. There was an increase in acid phosphatase activity as well as in the lysosomal enzymes in the unsedimentable or soluble fractions, although there was no significant change in the total lysosomal enzyme activity. These changes persisted for 7-14 days, gradually returning to normal. Early changes were best detected by histochemical methods or by these methods in combination with biochemical technics. The latter methods alone did not show a significant increase of acid phosphatase until 36 hr. Increases in β-glucuronidase and acid ribonuclease were not seen until 48 hr. These changes progressed for 7 days, returning to normal thereafter. Such early changes in the lysosomes prior to evidence of necrosis suggest that lysosomal injury may have a role in initiation or perpetuation of hepatic necrosis subsequent to MHVS viral infection.

9617 THE EFFECT OF CARBOHYDRATE-ENRICHED DIETS ON VIRUS HEPATITIS IN THE MOUSE. (E.) Zuckerman, A. J. (Guy's Hosp. Med. Sch., London) and I. Macdonald. Guy Hosp. Rep. 116(1): 33-37, 1967.

Weanling albino mice (10-15 g) were separated into 3 groups. One group was fed a normal, balanced diet; the other 2 groups were fed a diet containing 12% Ca caseinate, 81% carbohydrate, 5% salt mixture, and 2% dried yeast with added vitamins A and D; the carbohydrate supplied to 1 group was corn starch and to the other sucrose. Half the mice in each group were inj. i.p. with 0.1 ml of 6.3×10^{-5} of mouse hepatitis virus 3 (MHV3), and half of the mice were inj. with 1×10^{-2} of MHV1. After 12 wk. the animals were killed and weighed. The liver was excised, its wet wt. determined and portions fixed and prepared for histological examination; the remaining liver was dried in a vacuum dessicator, and the fat extracted. Collagen in the fat-free liver was measured. Some mice received virus inoculation at the beginning of the experiment; others received the virus after 6 wk. on the resp. diets. The mean body wt. of mice infected with MHV3 was lower throughout the experiment than the mean wt. of comparably uninfected groups on the control diet and on the starch diet. Mice on a sucrose diet tended to gain wt. less quickly than animals fed on the starch or the control diet. Infection with MHV 1 did not cause parenchymal cell necrosis, but when the animals were placed on a deficient diet some degree of necrosis of the liver ensued. Infection with MHV 3 resulted in marked necrosis of the parenchyma on the normal diet, with increasing severity of necrosis on the starch diet and almost complete hepatic necrosis on the sugar diet. No increase in either reticulum or collagen was noted in the livers of any group.

9618 PROBLEM OF TRANSFUSION HEPATITIS IN THE PUBLIC HEALTH SERVICE. (Ger.)(Rev.) Borgolte, W. *Oeff. Gesundheitswesen* 29(5-6): 245-250, 1967.

9619 CLINICAL AND EPIDEMIOLOGICAL PROBLEMS OF AN HEPATITIS STATION. (Ger.) Binder, L. (Laszlo Hosp., Budapest). *Wien. Z. Inn. Med.* 48(5):180-185, 1967.

9620 EPIDEMIOLOGY OF VIRAL HEPATITIS. (Ger.)(Rev.) Waldhaüsl, W. (U. Clin., Vienna). *Wien. Z. Inn. Med.* 48(5):177-180, 1967.

9621 VIROLOGY QUESTIONS IN HEPATITIS. (Ger.)(Rev.) Kunz, C. (U. Vienna). *Wien. Z. Inn. Med.* 48(5):171-173, 1967.

9622 SEROLOGY IN THE DIAGNOSIS OF HEPATITIS. (Ger.)(Rev.) Wiedermann, G. (U. Vienna). *Wien. Z. Inn. Med.* 48(5):173-177, 1967.

9623 SIGNIFICANCE OF THE HOYT-MORRISON TEST IN THE DIAGNOSIS OF VIRAL HEPATITIS. (It.) Rossi, R. (U. Florence, Italy), I. Berdondini and P. Bresci. *Riv. Clin. Pediat.* 78(4):567-581, 1966.

9624 TREATMENT OF ACUTE VIRAL HEPATITIS. (Ger.)(Rev.) Lindner, H. (DRK Hosp., Hamburg, Germany). *Landarzt* 43(19):910-918, 1967.

9625 ABSORPTION OF IRON (FERROUS SULFATE) IN PATIENTS WITH ACUTE VIRAL HEPATITIS. (It.) Curti, B. (U. Turin, Italy), G. Bianco, R. Doglio, A. Pasquale, F. Greco and L. Chiandussi. *Boll. Soc. Ital. Biol. Sper.* 43(6):326-328, 1967.

9626 VIRAL HEPATITIS. (Ger.)(Rev.) Deinhardt, F. (Presbyterian-St. Luk Hosp., Chicago, Ill.). *Landarzt* 43(19):893-8 1967.

9627 PERSISTENT HEPATITIS. (Ger.) Wild E. (City Hosp., Kassel, Germany). *Landarzt* 43(19):906-909, 1967.

9628 FULMINATING HEPATITIS WITH RECURREN HYPOGLYCEMIA AND HEMORRHAGE. (E.) Samson, R. I. (U. Cape Town, South Africa), C. Trey, A. H. Timme and S. J. Saunders. *Gastroenterology* 53(2):291-300, 1967.

9629 STUDIES ON THE BLOOD COPPER LEVEL CHILDREN. III. IN VIRAL HEPATITIS (It.) Castello, D. (U. Turin, Italy), P. G. Baroncelli, G. C. Rosmino and C. De Sanctis. *Minerva Pediat.* 19(25):1203-1206, 1967.

9630 PHYSIOTHERAPY FOR SEQUELAE AND LATE COMPLICATIONS OF INFECTIOUS HEPATIT IN CHILDREN. (Pol.) Szachnowicz, L. A. (2nd Child. Hosp., Kijow, Poland). *Pediat. Pol.* 42(6):679-684, 1967.

9631 SERUM PHOSPHOHEXOISOMERASE (EXPRESS IN BODANSKY UNITS) IN THE COURSE OF VIRUS HEPATITIS IN CHILDREN. (It.) Bonenti, (U. Turin, Italy) and L. Benso. *Minerva Pedi* 19(23):1108-1112, 1967.

9632 INACTIVATION OF HEPATITIS VIRUS MHV-3 BY INTESTINAL TISSUE OF RATS TREATED WITH PREDNISOLONE. (It.) Piazza, M. (U. Naples, Italy), G. Pane, L. Picciotto, D. and F. Piccinino. *Boll. Soc. Ital. Biol. Spe* 43(5):265-266, 1967.

9633 NEUTRALIZATION OF HEPATITIS VIRUS MHV-3 BY INTESTINAL TISSUE OF THE RAT IN THE PRESENCE OF BILE. (It.) Piazza, (U. Naples, Italy), L. Picciotto, C. Scioli, G. Pane and D. Lista. *Boll. Soc. Ital. Biol. Sper.* 43(5):266-268, 1967.

9634 CULTIVATION OF THE MURINE HEPATITIS VIRUS (MHV-3) ON MONOLAYER CULTURE RAT EMBRYONIC TISSUE. (It.) Picciotto, L. (U. Naples, Italy) and M. Piazza. *Boll. Soc. Ital. Biol. Sper.* 43(5):269-272, 1967.

TREATMENT OF INTRACTABLE ASCITES BY RE-
INFUSION OF UNMODIFIED AUTOGENOUS ASCITIC
. (E.) Pearlman, D. M. (Albert Einstein
Med., Bronx, N. Y.) and G. Duremdes. Surgery
:248-254, 1967.

patients with cirrhosis and intractable as-
were treated by i.v. infusion of their un-
ed autogenous ascitic fluid. All had been
regimen which included Na restriction, di-
cs of the thiazide group and aldosterone
onists. In addition, most received 1 or more
e following: salt-poor albumin, mercurial
tics, abdominal paracentesis, adrenal cortical
ids, aminophylline and mannitol. Four of
atients had such voluminous ascites that
ration and oral intake of food and liquids
compromised. Patients were allowed their
ar diet and fluids without restriction; they
given diphenhydramine (50 mg 4 times a day)
he dose of thiazide diuretic and aldosterone
onist which they had been receiving was con-
d. All patients tolerated the procedure
The only adverse reaction was moderate
ia in 3 patients; this symptom was controlled
antihistamines and acetylsalicylic acid with-
iscontinuation of the infusion. The amount
citic fluid reinfused ranged from 6.3-26.0
s. Reinfusion of ascitic fluid produced good
sis and improvement in general condition in
f the patients. Two illustrative case re-
are presented in detail.

THE CORRELATION OF CLEARANCE AND DIS-
TRIBUTION OF COLLOIDAL GOLD IN THE
AS AN INDEX OF HEPATIC CIRRHOSIS. (E.)
tie, J. H. (Euclid Glenville Hosp., Cleveland,
, G. Gomez Crespo, D. Koch-Weser and W. J.
tyre. Radiology 88(2):334-341, 1967.

a complete history and physical examination
included a complete battery of liver function
, 46 patients with a previous diagnosis of
osis were assigned to 1 of 4 clinical cate-
s: 1) no significant decrease in hepatic
ion, 10 patients; 2) minimal decrease in
ic function, 13 patients; 3) moderate de-
e in hepatic function, 13 patients; and 4)
e decrease in hepatic function, 10 patients.
patient was scanned with ^{131}I-rose bengal
olloidal ^{198}Au in doses varying from 0/2-0.45
th each dose individually calculated and
ted so as to maintain a peak counting rate
00 counts/min. with either material; inter-
between scans ranged from 10-14 days, so as
nimize any residual effect of the previous
Clearance measurements were conducted using
en 25-50 µc of ^{131}I-rose bengal or colloidal
. From the colloidal ^{198}Au scans and clear-
it was found that the combination of factors
olonged clearance time, spleen visualization
erihilar accumulation was almost invariant
ses of severe liver impairment; these char-
istics decrease in incidence with moderate
liver impairment, and the indications of proliferation about the hilus and decreased peripheral distribution were very useful in identifying the early minimal effects of this disease. Alterations in the distribution of the radioactive material demonstrated *in vivo* what was predicted by identification of arteriovenous anastomoses in cirrhosis; these alterations were paralleled throughout by the reduction of clearance of colloidal ^{198}Au, which was consistent with the existence of arteriovenous shunts.

9637 THE LEVEL OF ANTIDIURETIC HORMONE IN THE BLOOD OF PATIENTS WITH LIVER CIRRHOSIS AND ASCITES. (Rus.) Berezov, V. M. (Inst. Ther., Moscow). Ter. Arkh. 39(3):20-23, 1967.

The Jeffer's method for determination of antidiuretic hormone level in blood was not sufficiently sensitive in 5 healthy persons (23-35 yr. old) and in 5 patients (31-46 yr. old) with hepatic cirrhosis but no ascites, and conc. of antidiuretic hormone was considered zero. In 23 of 31 patients with hepatic cirrhosis and ascites (in 16 of 31 it was combined with edema of the lower extremities), the conc. of antidiuretic hormone in blood varied from 2.0-10.4 µU/ml of serum pituitrin "P" and was zero in 8 of 31 patients; the av. antidiuretic hormone level was 4.5 ± 0.58 µU of serum pituitrin "P". The postnecrotic form of hepatic cirrhosis was predominant in patients with (24) or without (3) ascites. There was no correlation between the antidiuretic hormone in blood, the degree of liver pathology, the activity of the cirrhotic process and the amount of ascites. Nineteen of 31 (in whom the characteristic symptom was oliguria) were resistant to commonly-employed diuretics; in 7 of 19, the Reberg test was normal, while the antidiuretic hormone level ranged from 0-10.4 µU. Hyponatremia was found in 11 patients with edema, in 8 of whom the antidiuretic hormone level varied from 4-10.4 µU/ml; instead of polyuria, they showed oliguria. The causes of antidiuretic hormone secretion in patients with liver cirrhosis and ascites, such as changes of osmotic blood pressure and decrease in intravascular vol., are discussed. An increase in the antidiuretic hormone blood level together with other factors plays a dominant role in the pathogenesis of ascites.

9638 ACTIVITY OF FIBRINASE IN LIVER CIRRHOSIS AND CHRONIC HEPATITIS. (Rus.) Malyarovsky, V. N. (Inst. Med. Radiol., Acad. Med. Sci., Moscow). Ter. Arkh. 39(1):61-62, 1967.

Fibrinase activity was measured in 17 patients with hepatic cirrhosis (Group 1) and in 10 patients with chronic hepatitis (Group 2), while 20 healthy normals served as controls. In Group 1 the av. fibrinase activity was 72%, in Group 2 it was 94%

and in controls, 100%; the tolerance of plasma to heparin was 1335 sec., 890 sec. and 556 sec., resp.; blood prothrombin activity was 76%, 92% and 100%, resp.; plasma recalcification time was 172 sec., 120 sec. and 94 sec., resp.; and fibrinolysis time was 228 min., 270 min. and 300 min., resp. No parallel relationship was found between fibrinase activity and other indices of blood coagulation. In Group 1 there was an inverse relationship between fibrinolytic activity and fibrinase activity. In most patients with increased fibrinolytic activity there was a more pronounced decrease in fibrinase activity, especially in patients with hemorrhagic diathesis.

9639 BETA-GLUCURONIDASE ACTIVITY IN THE LYSOSOME FRACTION OF NORMAL AND CIRRHOTIC HUMAN LIVER.

(It.) Giglio, F. (U. Palermo, Italy), L. Pagliaro, S. Le Moli, P. Citarrella, A. Notarbartolo and G. Migneco. Fegato 12(4):478-487, 1966.

β-Glucuronidase activity was studied in lysosome suspensions obtained from 8 normal subjects and from 18 patients with cirrhosis (12 with severe hepatic failure and massive ascites; 6 with moderate failure and without ascites). As compared to cirrhotic patients with severe hepatic failure, those with moderate failure presented less free enzyme activity (av. 26.8 against 31.9 μmoles x 10^3 of phenolphthalein released per mg of lysosome protein), higher total activity (av. 111.3 against 55.8 μmoles x 10^3 of phenolphthalein), and markedly lower free:total enzyme activity ratio (av. 23.44% against 57.94%), the last parameter being statistically significant. As compared to normal subjects, patients with moderate hepatic insufficiency presented greater free enzyme activity (av. 26.8 against 6 μmoles x 10^3 of phenolphthalein), the same total enzyme activity, and significantly higher free:total activity ratio (23.44% against 5.04%). No correlation was observed between free:total activity ratio and γ-globulins; slight correlation was seen between free:total activity ratio and blood albumin levels; the free:total activity ratio was inversely proportional to the serum pseudocholinesterase content. It is concluded that the increase in the free:total enzyme activity ratio observed in patients with cirrhosis is proportional to the degree of functional hepatic insufficiency.

9640 CORRELATION OF SERUM L-PHENYLALANINE-SENSITIVE ALKALINE PHOSPHATASE, DERIVED FROM INTESTINE, WITH THE ABO BLOOD GROUP OF CIRRHOTICS.

(E.) Stolbach, L. L. (Lemuel Shattuck Hosp., Boston, Mass.), M. J. Krant, N. I. Inglis and W. H. Fishman. Gastroenterology 52(5):819-827, 1967.

In this study, 139 patients with hepatic cirrhosis were found to have serum levels of L-phenylalanine-sensitive alkaline phosphatase which correlated with ABO blood groups, suggesting that genetic factors may play a role in determining the extent to which enzymes of intestinal orig
contribute to the elevation of serum alkaline
phosphatase. The physiology underlying the
elevation of the enzyme in the serum of these
patients is poorly understood at present. No
correlation could be made with such factors as
increased portal pressure as manifested by
esophageal varices or the pressure of ascites.
The significantly higher incidence of L-phenyl
alanine-sensitive alkaline phosphatase to tota
alkaline phosphatase ratios of greater than 0.
in cirrhotics with Blood Types B and 0 was fou
to exist in patients with normal levels of to
alkaline phosphatase, as well as in patients
elevated levels. Higher mean levels of total
alkaline phosphatase were found in patients wi
Blood Type 0 than in those with Type A. These
elevations were due partly to higher mean leve
of the L-phenylalanine-sensitive isoenzyme.
intestinal origin of a major part of the L-phe
alanine-sensitive alkaline phosphatase is sug
by starch gel electrophoresis of the serum in
which a slow-moving band was inhibited by L-p
alanine, migrating to the location of purifie
intestinal alkaline phosphatase. The results
the present study support a genetic mechanism
controlling the serum levels of L-phenylalani
sensitive alkaline phosphatase and, in turn,
alkaline phosphatase. These results contribu
as well, to a better interpretation of the si
nificance of hyperphosphatemia.

9641 NEGATIVE LIVER FUNCTION TESTS IN CA OF PORTAL CIRRHOSIS.

(It.) Maldac
(Riuniti Hosp., Rome), A. Beni and C. Pingi.
Gazz. Int. Med. Chir. 72(9):779-787, 1967.

Among 370 patients with confirmed hepatic cir
rhosis observed over the past few yr., 17 (4.
showed no significant serum protein or colloi
lability alterations. Jaundice was present i
6 of the 17 patients. Diabetes mellitus was
present in 8 of the 17 (48%) patients, althou
insulin treatment was required in only 1.
Esophageal varices and neurological manifesta
were present in 6 and 9, resp., of the 17 pat
Electrophoresis was performed in 10 patients
was normal in 5; 3 showed an increase in bot
α_2- and β-globulins, while 2 showed an increa
α_2- and β-globulins, resp. γ-Globulin level
normal in all 10 patients. Glycoprotein mea
ment in 1 patient revealed an absence of γ-g
lins. The sulfobromophthalein test was posi
in 3 of 5 patients. Alkaline phosphatase an
transaminase levels, prothrombin time, as we
as serum levels of free cholesterol and chol
terol esters were altered in most of the patients. Three illustrative cases are descri
The authors conclude that the apparent discr
between clinical and laboratory data in thes
patients with cirrhosis is due either to ass
diseases (diabetes, for example) or to parti
biochemical disturbances, such as lack of in
of γ-globulins.

SPATIAL RELATIONSHIPS BETWEEN HEPATO-
CYTES AND SINUSOID ENDOTHELIAL CELLS IN
HEPATIC CIRRHOSIS. (It.) Cavalli, G. (U.
na, Italy), F. B. Bianchi and G. Bacci.
o 13(1):55-65, 1967.

ron microscope studies were conducted on
ic tissue (obtained with the Menghini biopsy
e and fixed in Palade's soln. containing
se) from 10 patients with hepatic cirrhosis.
paces of Dissé were abnormal in 1 or more
e following ways: the endothelial cells
d a continuous outer layer; a finely granular
ance, irregularly arranged, formed a layer
rying thickness immediately beneath the en-
lial cells (this layer resembled a basal
ane but appeared in discontinuous tracts);
llar structures were more frequent than in
l spaces; the hepatocyte surface proximal
e space of Dissé appeared to be without
villi, forming raised extensions; reduction
e space between hepatocytes and endothelial
for more or less long tracts caused direct
ct between the 2 types of cells (this condi-
being facilitated by the absence of micro-
and the presence of such uniting structures
smosomes and zonula adherens). The authors
ude that these morphological changes are
y to influence the normal exchanges between
helial cells, circulating blood, and hepato-
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SIGNIFICANCE OF BLOOD SERUM ENZYME AND
LIVER TISSUE INVESTIGATION FOR THE
SMENT OF THE ACTIVITY OF THE PROCESS IN
IC CIRRHOSIS. (Rus.) Bondar, Z. A. (First
w Med. Inst.), S. D. Podimova and V. B.
arevskii. Ter. Arkh. 39(1):54-60, 1967.

ctivity of glutamine-alanine transaminase in
(in U/ml) and in punch biopsy material (in
issue) in 34 patients with hepatic cirrhosis
g the active stage of the disease (Group 1)
7.6 and 13,800, resp.; during the inactive
of the disease (Group 2) it was 33 and
0, resp., and in 16 patients with chronic
itis (Group 3) it was 30 and 16,643, resp.
oup 1 the activity of glutamine-aspartic
aminase in serum and punch biopsy material
3.8 and 30,500, resp.; in Group 2, it was
and 27,410, resp., and in Group 3, 39 and
0, resp. The decreased activity of glutamine-
ne transaminase activity appeared to be a
quence of less parenchyma in far-advanced
osis of the postnecrotic or mixed type, and
evelopment of dystrophic changes in the
ocytes. The activity of phosphohexoseisomerase
rum (in μg of fructose) and in punch-biopsy
ial (in mg of fructose/g tissue) in Group 1
2 and 60.4, resp., in Group 2, 42.9 and
resp., and in Group 3, 41 and 44, resp.
ity of alkaline phosphatase in serum (in
sky U) and in puncture-biopsy material (per
tissue) was 7.1 and 14.3, resp., in Group 1;
oup 2 it was 6.5 and 9.6, resp., and in
3, 2.4 and 4.7, resp. The increase in glutamine-alanine, glutamine-aspartic transaminase and phosphohexoseisomerase activity in liver tissue indicates pronounced regenerative and inflammatory processes in developing hepatic cirrhosis, while their increase in blood sera indicates rapidly-developing cirrhosis. Two case histories are presented in detail.

9644 PROGRESSION OF ACUTE HEPATITIS TO POSTNECROTIC CIRRHOSIS. (E.) Schaeffer, J. W. (U. Cincinnati Coll. Med., Ohio), L. Schiff, E. A. Gall and Y. Oikawa. Amer. J. Med. 42(3): 348-358, 1967.

This process was documented in 5 patients by serial histological observations. In none was the source of hepatitis known; alcoholism, hepatotoxins, and drugs were not implicated. The hepatitis was assumed to be of viral etiology in view of the characteristic histological and clinical features. In none were the onset of illness and the preicteric period abrupt or unusually severe. Malaise, weakness, and complaints of upper gastrointestinal tract involvement were the foremost symptoms. The most obvious findings were deep jaundice and a moderately enlarged liver; the spleen was palpable in 3. Jaundice reached a peak during the fifth wk. and continued for 16 wk. Two experienced a relapse during the course of subsiding jaundice during the first mo. after illness. Three received steroid therapy during the first episode of jaundice; in 2, complete remission of activity was observed at 10 and 14 mo., resp., despite development of cirrhosis; in the third, the clinical symptoms and biochemical abnormalities responded, but there was no interruption in the progressive hepatocellular necrosis leading to death in hepatic coma within 3 yr. In the 2 not treated with steroids, 1 recovered within 4 mo., the other died in hepatic coma after 4 yr. At the height of jaundice, the serum total bilirubin was 13.4-44 mg% (av. 26.1); there was a constant elevation of SGOT compared with SGPT. Significant hypoalbuminemia and elevated serum globulin levels were observed. Serum turbidity and flocculation tests were consistently abnormal. Of the 3 surviving patients: in 2 serum transaminases and bilirubin values are normal and there was no BSP retention; values were minimally abnormal in 1.

9645 FREE FATTY ACIDS AND THE ACTIVITIES OF LIPOPROTEIN LIPASE AND POST-HEPARIN ESTERASE IN LIVER CIRRHOSIS. (Ger.) Fabian, E. (Charles U., Prague), L. Kučerová, A. Štork and J. Šponarová. Z. Ges. Inn. Med. 22(3):74-77, 1967.

Twenty patients with hepatic cirrhosis and (16 cases with Laennec's cirrhosis, 3 with biliary cirrhosis, and 1 person in hepatic coma) furnished fasting blood samples for the determination of serum levels of lipoprotein lipase, postheparin esterase activity; and free fatty acid conc. The same parameters were measured in 20 healthy individuals. The av. values for the 16 patients with Laennec's cirrhosis compared to those of the 20 healthy individuals: Lipoprotein lipase, 20.73 U in Laennec's cirrhosis, 29.88, in normals; post-heparin esterase (μM Ca laurate) 0.49 in Laennecs, 7.42 in normal males, 3.94 in normal females; free fatty acids (μEq/liter) fasting plasma 892 Laennec's, 491 normal. Rise in free fatty acids (μEq/liter) after heparin inj., 521 in Laennecs, 846 in normals. Total fat mg% 695 Laennecs, 842 in normals. Total cholesterol in mg% 191 in Laennecs, 232, in normals. Total protein g%, 7.83 in Laennecs, 7.46 in normals. The free fatty acid levels were significantly increased in Laennecs cirrhosis over those in healthy persons; lipoprotein lipase was significantly reduced in Laennec's disease as was also post-heparin esterase. The individuals with biliary cirrhosis showed considerable variation in the same categories. There was a doubling of free fatty acid after heparin inj. so that post-heparin esterase was significantly increased. Lipoprotein lipase was increased in hepatic coma.

9646 PHYSIOPATHOLOGY OF JAUNDICE IN HEPATIC CIRRHOSIS. (Fr.) Pavel, I., S. Campeanu, C. Dumitrescu and H. Bonaparte. Arch. Franc. Mal. Appar. Dig. 56(3):121-140, 1967.

Various factors determining or influencing jaundice in hepatic cirrhosis were studied in 9 patients with cirrhosis but with no overt jaundice and in 3 frankly jaundiced cirrhotic patients. Hemoglobin formation and av. age of RBC were measured by radioactive methods; the effects of controlled induced hyperhemolysis, induction of increased hypersideremia, and the action of carbaminoylcholine upon the BSP clearance were studied for definite evidence of correlation with jaundice. Optical microscopy of liver biopsies were also done, as well as studies of the effects of methyl-17-testosterone upon the liver parenchyma. Of these, hemoglobin formation antagonized jaundice whereas the other tests increased bilirubin formation. The extent and interaction of factors in the patient made précise determination of the onset and severity of jaundice difficult to predict. When hemoglobin formation is predominant in hepatic cirrhosis, jaundice is not evident. Jaundice in portal cirrhosis cannot be explained by mechanical obstruction caused by sclerosis and compression or obliteration of bile ducts. However, logical factors in other types of cirrhosis may cause jaundice, such as 1) imbalance between the production and elimination of bile pigments, 2) acquired hyperhemolysis such as that due to chronic malaria or intercurrent infection, 3) changes in hepatic arterial blood flow, 4) a functional obstruction, such as a stone, in the extrahepatic biliary ducts.

9647 THE EXCRETION OF COPROPORPHYRIN ISOMERS I AND III IN DISEASES OF THE LIVER AND BLOOD. (Ger.) Clotten, R. (U. Freiburg/Brg., Germany) and A. Doyen. Z. Klin. Chem. 5(2): 54-59, 1967.

The normal urinary excretion of coproporphyrin
was established in 40 healthy subjects of both
sexes. In order to preclude latent diseases,
especially those of the liver, these controls
were given a series of tests before determinat
of coproporphyrin. These tests were for serum
transaminases, hemoglobin, RBC, hematocrit, WB
differential count, and serum protein electro-
phoresis. The pathological cases tested compr
12 virus hepatitis, 1 acute yellow liver atrop
18 liver cirrhoses of different degrees of
severity and different etiologies, 12 severe F
deficiency anemias, 4 panmyelopathies, 11 con-
genital achrestic (hypoplastic) anemias, 4 hem
lytic anemias,of different genesis, 1 Cooley's
anemia, 2 leukemias, 1 Hodgkin's disease, and
severe bleeding anemia. Coproporphyrins were
extracted or separated by high voltage electro
phoresis immediately from 24-hr. urine specime
and analyzed by spectrophotometer. Isomers we
determined by paper chromatography. Normal ur
nary coproporphyrin excretion in middle age wa
between 41 and 182 μg/day for men with a mean
of 88.6 ± 30.2 μg, and 43-135 μg/day for women
with a mean of 70.8 ± 28.1 μg. Healthy men an
women had a predominant urinary excretion of c
proporphyrin III (64.8% and 62.2%, resp.). In
orders of the liver, nonalcoholic cirrhosis wa
accompanied by a prevalance of coproporphyrin
alcoholic cirrhosis caused an increase of copr
porphyrin III. Coproporphyrin I predominated
in only a few cases of hepatitis; most cases c
clinical hepatitis showed a distribution of th
isomers similar to the normal. Among the hepa
cases only 2 had a greater than normal excreti
of coproporphyrin. The normal excretion of co
porphyrin in the hepatitis patients (except 2)
was in line with the other values in laborato
tests (within the normal range). Most of the
cirrhosis patients showed 24-hr. coproporphyri
excretion above 200 μg (av. 335 μg/24 hr.); a
few were in the normal range. The highest cop
porphyrin conc. excreted in the urine occurred
Fe-deficiency anemias (mean 404 ± 41 μg). In
panmyelopathy the amount observed was 388 ± 1
μg/day; congenital hypoplastic (sideroachresti
and hemolytic anemias presented about the same
picture (308 ± 141 and 300 ± 223/24 hr.).

9648 PATHENOGENESIS OF HEPATIC COMA. (Ge
Müting, D. (First Med. U. Homburg/Sa
Germany), H. Reikowski, W. Eschrich and H. Bu
Verh. Deutsch. Ges. Inn. Med. 72:649-652, 196

Various biochemical determinations were made
116 patients. One was a case of decompensate
hepatic cirrhosis, with bleeding of esophagea
varices, following which, over a considerable
period of time, there occurred hepatitis the
bilirenal syndrome, obstructive jaundice, and
intoxication. Among the 116 patients, 84 were
in Terminal Stage III and 32 in Stages I and
of hepatic coma; a long observation period wa
possible in 90 of these cases. The same meas
ments were made in 50 normal subjects. Free
α-amino nitrogen in the cerebrospinal fluid o

normal subjects av. 0.8 mg%; of those with tic disease without coma, 1.4 mg%; of those recoma, 2.8 mg%; and in hepatic coma, 3.7 mg%; ne same order the serum levels of α-amino- ogen were, resp., 4.2, 4.8, 6.0 and 7.2 mg%. ne same order, the cerebrospinal fluid values free phenols were 0.60, 1.2, 1.85 and 2.8 mg% the serum levels for free phenols, resp., 0.92, 1.85, 2.92 and 4.0 mg%. Ammonia in the rospinal fluid av. 31 μg% in the normal, g% in those with hepatic disease without signs oma, 230 μg% in those with precoma and 480 in those with coma; the corresponding blood ls were 62, 160, 280 and 500 μg%, resp. , among these 3 parameters these were in- sing conc. in blood and cerebrospinal fluid increasing severity of hepatic disease. ysis tended to restore the free phenols and nia content almost to normal (from 6 mg% to t 1.6 mg% for the free phenols and from over ug% of ammonia down to 180 mg% in the serum) the values became immediately elevated follow- dialysis of more than 48 hr. The height of the nia conc. did not necessarily bring about nopathologic syndromes. A patient in the oma stage with decompensated alcoholic cir- is had been on a protein-free diet and neo- n therapy so that the blood ammonia level was al following infusion of ammonia-decreasing tances; the mental difficulties of the patient red up at the same time. A lapse in diet ed a renewed rise in ammonia conc. to the ious levels but without the appearance of nopathology; the blood and cerebrospinal levels ree phenols had not increased. The free phenol and the conc. of metabolic byproducts of ntaining amino acids may be important in ng brain damage in hepatic disease. Indican ndole derivatives appear to play only a minor in the pathogenesis of hepatic coma.

EXPERIMENTAL LIVER INJURY IN THE RHESUS MONKEY: I. EFFECTS OF CIRRHOGENIC AND ETHANOL. (E.) Cueto, J. (West Virginia Ctr., Morgantown), N. Tajen, E. Gilbert and Currie. Ann. Surg. 166(1):19-28, 1967.

observation for 6 mo. while on a diet of na monkey chow, 9 male Macaca mulatta monkeys divided into 3 groups: Group 1 (3 animals), ved a high-fat, low-choline, low-protein diet, n addition, they were given ethanol (5 g/kg, nes a wk. by gavage, diluted 1:1 with bi- onate soln.); Group 2 (3 animals) were fed na chow and, in addition, received ethanol avage with 1 g choline added as a supplement, twice/wk. protein supplement; Group 3 (2 als) were fed a high-fat, low-choline diet out ethanol. One animal was followed as a rol on a standard diet of Purina monkey chow ad libitum. At the end of an 8-mo. period, ficant liver damage and elevation of portal is pressure were produced by a low-choline, -fat diet. Oral ingestion of alcohol did not avate the injury produced by this diet, nor t significantly alter hepatic function or structure in animals fed a normal diet with protein and choline supplements. Admin. of ethanol was associated with the development of gastritis in several animals and, in both groups in which it was given, alcohol tended to depress appetite and diminishethe total caloric intake of the animals. These preliminary results suggest that hepatic cirrhosis, portal hypertension and abnormal portosystemic communications similar to those seen in human cirrhosis can be produced by the cirrhogenic diet in the Rhesus monkey; additional research is needed to determine how similar to human cirrhosis this experimental injury may be. The chronic liver disease and portal hypertension produced in this manner may furnish a good experimental model to investigate the causes and treatment of portal cirrhosis and its complications.

9650 COLLAGENOLYTIC ACTIVITY AND COLLAGEN RESORPTION IN EXPERIMENTAL CIRRHOSIS. (E.) Morrione, T. G. (Long Island Coll. Hosp., Brooklyn, N. Y.) and J. Levine. Arch. Path. (Chicago) 84(1):59-63, 1967.

Cirrhosis was induced in male Sprague-Dawley rats (175-200 g body wt.) by inhalation of CCl_4; in addition, α-naphthylisothiocyanate cirrhosis was induced in 50 rats (100-125 g wt.) by feeding 1 g α-naphthylisothiocyanate to 1 kg powdered laboratory chow. The collagenolytic activity of extracts of rat livers was significantly decreased when hepatic damage was induced by CCl_4 or α-naphthylisothiocyanate. Elevation of enzyme activity was observed during the phase of active collagen resorption in recovery from CCl_4 cirrhosis. Partial hepatectomy (65%-75%) was accompanied by resorption of collagen and increased enzyme activity in reversible CCl_4 cirrhosis, whereas in irreversible cirrhosis neither of these changes was seen. Human liver showed collagenolytic activity similar to that which was seen in rat liver. Liver glycogen content ranged from 0.49%-3.38% (net wt.), av. 2.90% in normal liver. Both hepatotoxic agents as well as subtotal hepatectomy depressed hepatic glycogen content, and glycogen levels rose in all animals during recovery from hepatic injury. Normal liver showed a value of 21.7% of dry fat-free wt.; all forms of hepatic injury as well as subtotal hepatectomy lowered the percentage of dry fat-free wt. to as little as 15.9%; these lowered values showed a rise during the recovery stages. Max. enzymatic activity was found in the "light mitochondrial" fraction, indicating lysosomal origin. A 7-day fast resulted in a 35% loss of body wt. (in 3 rats, av. body wt. declined from 268 to 175 g), a 72% loss of liver wt. (from 14.9 to 4.2 g), a 3-fold increase in percentage of collagen in the liver (from 0.11% to 0.37% wet wt.), with an actual resorption of 4.3% of total hepatic collagen. However, during this period collagenolytic enzyme activity declined to a level 25% below normal. In both forms of cirrhosis which were studied, no cellular alterations could be correlated with the changes in enzyme activity in the various stages of induction or reversal of cirrhosis.

Both CCl_4 and α-naphthylisothiocyanate produced a depression of hepatic enzyme activity.

9651 EFFECT OF PORTACAVAL SHUNTS ON LYMPH FLOW IN THE THORACIC DUCT. EXPERIMENTS WITH NORMAL DOGS AND DOGS WITH CIRRHOSIS AND ASCITES. (E.) Orloff, M. J. (Harbor Gen. Hosp., Torrance, Calif.), B. Goodhead, C. W. O. Windsor, M. E. Musicant and D. L. Annetts. *Amer. J. Surg.* 114(2):213-221, 1967.

The primary hemodynamic lesion in cirrhosis is hepatic venous outflow obstruction; much evidence has been accumulated which indicates that both the increased production of lymph and the formation of ascites in experimental and human cirrhosis are produced by elevation of intrahepatic pressure which results from outflow obstruction. Accordingly, the capacity of end-to-side and side-to-side portacaval shunts to reduce intrahepatic pressure was evaluated by measuring the effects of these procedures on pressure and lymph flow in the thoracic duct of 50 dogs. The latter were divided into 5 groups: Group 1, 10 normal dogs; Group 2, 20 normal dogs with portacaval shunt; in 15, an end-to-side anastomosis was performed, and in 5 a side-to-side shunt; Group 3, 6 dogs in which congestive cirrhosis, portal hypertension and massive ascites were produced by ligation of the hepatic veins; Group 4, 6 dogs subjected to an end-to-side portacaval shunt after congestive cirrhosis, portal hypertension and massive ascites were produced by hepatic vein ligation; Group 5, 8 dogs which underwent a side-to-side portacaval shunt after production of congestive cirrhosis, portal hypertension and ascites by ligation of the hepatic veins. Hepatic vein ligation resulted in massive ascites, which av. 4.0 liters, portal hypertension, which av. 208 mm of saline soln., a mean 13-fold increase in thoracic duct lymph flow and a mean elevation of thoracic duct pressure which was almost 3 times the normal level. The end-to-side portacaval shunt reduced the high rate of lymph production and the elevated pressure significantly, but a 5-fold increase in lymph flow and an approx. 2-fold elevation of thoracic duct pressure persisted. The side-to-side portacaval shunt lowered thoracic duct pressure to normal in every dog, and either abolished the excessive lymph formation or markedly reduced the rate of lymph production. These findings indicate that the side-to-side portacaval shunt is more effective than the end-to-side anastomosis in overcoming intrahepatic hypertension and decompressing the obstructed hepatic vascular bed. These results represent an important consideration in the selection of surgical therapy for intractable cirrhotic ascites, and may have some bearing on the effects of portacaval shunts on nutrition of the hepatic parenchyma.

9652 FAMILIAL PIGMENTARY INFANTILE CIRRHOSIS. (Fr.) Nezelof, C. (Necker Hosp., Paris), J. M. Watchi, P. Ganter and A. Brault. *Presse Med.* 75(9):451-456, 1967.

Two sisters with familial pigmentary cirrhosis
were studied during their brief infancies. Th
elder had in the first few wk. suffered coryza
laryngitis; at 3.5 mo. digestive troubles nece
sitated hospitilization during which ascitis a
cells with black pigmentation were found; the
patient weighed 6200 g, had an enlarged abdome
and varices in the epigastrium; the liver and
spleen were not enlarged; RBC were 2,490,000/m
35% hemoglobin, 8200 WBC with normal different
count; the ascitic fluid was poor in protein;
there was no proteinuria and no reducing bodie
in the urine. Wasserman and Bordet tests of t
parents were negative. The patient lapsed int
a coma and died 3 days after admission. Autop
disclosed a small liver weighing 120 g, showin
multiple, light-colored nodules, 2-15 mm in
diameter; these nodules were much softer than
parenchyma of the liver. The biliary tract an
gallbladder were normal; the spleen was a litt
enlarged but appeared functionally normal; no
esophageal varices were noted; other than an
ulcerous laryngitis no other gross pathologica
conditions were found. The histology of the l
revealed general cirrhosis; dense fibrosis, po
in cells and practically free of inflammatory
types was found both in peri- and intralobular
sites with spans of liver tissue in contact wi
the fibrosis showed a tendency to form canals
peppercorn structures, with enlargement of bil
canals. Abundant pigment deposits were noted
the cytoplasm of liver cells. This pigment wa
in 2 forms: 1 of large particles, ochre or
brown, looking somewhat like granules of hemos
erin; the other form showed very fine granules
of the same color; the pigment granules were
isotropic in polarized light; they were not, o
very slowly, bleached by hydrogen peroxide; th
Fe was ferric; protein was found in conjunctio
with it. All other tests such as for bilirubi
and lipopigments, among others, proved negativ
The Fe-pigment granules occupied the biliary p
of the hepatic cells grouped about or in the
neighborhood of the biliary canaliculi. Histo
study revealed islands (especially in the nodu
of regenerating hepatic tissue. Some changes
found in other orggans, but no trace of Fe deposition was found in any other organ than the
liver. The younger sister had a different ear
medical history; she died at the age of 8 wk.
Autopsy revealed an ascitis, and a small cirrhotic liver, absolutely comparable to that of
older sister. The histologic lesions were ide
cal in every respect. This anicteric disease
of rapid fatal course is probably a congenital
metabolic disease.

9653 TREATMENT OF LIVER CIRRHOSIS WITH ANTIMETABOLITES. (Fr.) Terrase, J.
S. Moinade and D. Rigal. *Presse Med.* 75(13):6
654, 1967.

A group of 21 alcoholic cirrhotics were treate
with antimetabolites; another group of 22 cirrhotics were treated by the classical method;
of the first group received cyclophosphamide

) mg/day); 8 were given 6-mercaptopurine (6-MP,
-200 mg/day); 1 case was given mannomustine
2 others received cyclophosphamide and then
P. All received antibiotics. Of the 22
ated by the classical method, 4 showed ameliora-
n and 11 were unchanged; of the 21 treated with
imetabolites 10 were improved and 3 were un-
nged. The reduction of inflammatory states
e to the antimetabolites) promoted healing.
ticosteroid anti-inflammatory therapy was also
in. Because of the relatively few cases
lied, and the well-known variations encountered
cases of cirrhosis, definite conclusions cannot
drawn. The impression remains, however, that
se treated with antimetabolites ran an easier
rse and showed a greater degree of recovery
n those without them; 6-MP seemed to be more
icient than cyclophosphamide.

ABNORMAL GLYCOREGULATION AFTER PORTA-CAVAL SHUNT. A STUDY OF DISTURBANCES
CARBOHYDRATE METABOLISM IN HEPATIC CIRRHOSIS.
.) Bour, H., M. Tutin, J. Lataste, J. P.
dler, Y. Ricquois and M. Rotterdam. Diabete
2):142-150, 1967.

5 OXYGEN AFFINITY OF HEMOGLOBIN IN PATIENTS WITH CARDIOVASCULAR DISEASES,
MIA, AND CIRRHOSIS OF THE LIVER. (E.)
hausen, R. (State Hosp., Copenhagen), P.
rup and K. Kjeldsen. Scand. J. Clin. Lab.
est. 19(3):291-297, 1967.

6 DEVELOPMENT OF CONCEPTS ON PORTAL HEMODYNAMIC CHANGES IN HEPATIC CIRRHOSIS AND SUBSEQUENT SURGERY.. (It.) Modiano, C. (S. Maria Nuova Arcispedale, Florence, Italy). Osped. Ital. Chir. 16(3):353-358, 1967.

9657 SERUM TRIGLYCERIDES IN HEPATIC CIRRHOSIS. (Pol.) Wojnar, S. and B. Milewski. Pol. Arch. Med. Wewnet. 38(6):787-791, 1967.

9658 ROLE OF CHRONIC COLITIS IN THE AETIOPATHOGENESIS OF CIRRHOSIS LIVER. (E.) Kasliwal, R. M. (S.M.S. Med. Coll., Jaipur, India), V. S. Baldwa, B. M. Sharma and M. L. Sharma. Indian J. Med. Res. 55(5):411-420, 1967.

9659 INFLUENCE OF CIRRHOGENIC DIET ON RABBIT EXPERIMENTAL ATHEROMA. (Fr.) Warembourg, H. (Fac. Med., Lille, France), G. Biserte, M. Bertrand, J. Jaillard, G. Sezille and L. Adenis. C.R. Soc. Biol. (Paris) 161(2):334-337, 1967.

9660 ETIOLOGY AND PATHOGENESIS OF HEPATIC CIRRHOSIS. (Ger.)(Rev.) Čerlek, S. (U. Zagreb, Yugoslavia). Wien. Z. Inn. Med. 48(5):196-203, 1967.

9661 DETERMINATION OF THE IMMUNOLOGIC PROPERTIES OF SERUM PROTEINS IN HEPATIC CIRRHOSIS. (Rus.) Shorokhova, L. P. (Tashkent Med. Inst., USSR). Med. Zh. Uzbek. (4):11-14, 1967.

See also abstract no.: 9264

9662 DIAGNOSTIC SIGNIFICANCE OF THE REFLUX OF THE CONTRAST MEDIUM INTO THE PANCREATIC DUCT IN OPERATIVE CHOLANGIOGRAPHY. (Rus.)

Pautkin, Y. F. (Patrice Lumumba U., Moscow). Vestn. Rentgen. Radiol. 42(1):48-51, 1967.

Reflux of contrast preparations into the pancreatic duct at surgical cholangiography was found in 43 (33%) of 132 patients. Contrast preparations (diodone, acetrizoic acid, and others, as 25% soln.) was admin. by puncture of the bile duct in 21, through the vesicular duct in 109 and by a combination of both in 2. Of 60 patients without any pathological changes of the terminal portion of the common bile duct and pancreas, 20 showed reflux of the contrast preparation. In the remaining 72 patients with pathological changes of the distal part of the common bile duct and pancreas, 23 exhibited reflux. The latter was found most frequently in the presence of the inflammatory process in the pancreas (11 of 22), and rarely in the presence of bile stones, spasms or stenosis. Reflux at the time of the first photograph (at the moment of termination of contrast admin.) was found in 30 of 43, and later at the time of the second photograph (after 3 min.) it disappeared; in 13, reflux was evident at both photographs (in 9 patients with and 4 without pathologic changes). Of 43 patients with reflux, residual pressure was increased in 28; of 89 patients without reflux, increased residual pressure was noted in 73. Therefore, reflux of contrast preparations into the pancreatic duct should not be evaluated as a sign of pathological changes of the distal portion of the common bile duct and pancreas.

9663 PSEUDO-OBSTRUCTION FOLLOWING POST-CHOLEDOCHOTOMY CHOLANGIOGRAPHY. (E.)

Ginzburg, L. (Beth Israel Med. Ctr., New York, N. Y.), A. Geffen and I. H. Friedman. Ann. Surg. 166(1):83-90, 1967.

During 1962-1966, 71 choledochotomies for calculus disease were performed at Beth Israel Hospital; in 56, an immediate post-choledochotomy T-tube cholangiogram was performed, using 35% Diodrast as a contrast medium. In 30 of 56 cases, the contrast medium did not immediately appear in the duodenum; in 4, such passage was seen on films taken 10-20 min. later. No passage occurred in 26 patients. In 24 of the 26 patients, there was no evidence of either calculus or any other intraluminal obstruction and the ducts were not re-explored. In 2 cases re-exploration was made because of irregular filling of the distal duct associated with obstruction; in 1 case an additional small calculus was removed, but even after this, contrast material did not enter the duodenum. In the second patient, re-exploration was negative, but the contrast medium again failed to enter the duodenum. In all 56 patients, regardless of the findings in postcholedochotomy radiography, postoperative cholangiography 10-14 days later showed free passage into the duodenum, and no evidence of calculus or other abnormal findings. It is thought that failure of radio-opague mat to enter the duodenum during postoperative cholangiography results from spasm or edema at the choledochal (Boyden's) sphincter or the du denal wall itself, and not at the sphincter of Oddi. The relationship of reflux into the pan creatic duct (which occurred in 2 of 56 cases) to spasm of the choledochal and ampullary (Odd sphincters is also discussed.

9664 STUDIES ON THE ORIGIN OF INCREASED SERUM AMYLASE FOLLOWING INFUSION OF THE BILE DUCT WITH AN ENZYME-CONTAINING SOLUTI

(Ger.) Heinkel, K. (U. Erlangen-Nuremberg, Germany) and H. Spanknebel. Z. Gastroent. 5(2 94-96, 1967.

Ten rats (140-230 g) had the common bile and pancreatic duct catheterized and the catheter ligated close to the duodenum. The bile duct was ligated near the liver hilus in 6 animals that an infusion only into the pancreas was po sible. The supernatant of a suspension of 0.5 dried pancreatin in 25 ml of 0.9% NaCl after c trifugation was used for infusion at a definit pressure with a known amount of fluid. The amylase activity of this fluid broke down 105. of starch (Heinkel and Spanknebel); 3 of these 6 rats received a betacholine inj. i.p. 30-40 min. after beginning of infusion. Before and during the infusion, at 15-min. intervals, the amylase blood level was measured. The blood amylase conc. rose from an av. equivalent of 4 at the beginning to 9.2 g% in 30-45 min. Inj. i.p. of betacholine at this point caused an ex cessive rise in blood amylase conc. The infus pressure was between 20 and 30 mm Hg with an a inflow of 2.4 ml in 15 min. into the pancreas which was edematous before inj. of betacholine Edema disappeared when betacholine was inj.; the inj. caused a rise in the blood amylase equivalent from 4.9 g% on the av. to 39.5 g%. The blood amylase conc. was also increased by vagal stimulation (no values given) during the time of infusion. Betacholine caused flow of fluid (possibly containing excess amylase) fro interstitial spaces back into blood stream. out the ligature on the bile duct close to the hilus the infusion fluid passed rapidly throug the liver parenchyma into the blood.

9665 OCCLUSION OF THE BILE DUCT AND ENZYME ACTIVITY IN THE SERUM. (Ger.

Schultz, C. (City Hosp., Remscheid, Germany) and E. Schmidt. Klin. Wschr. 45(3):162-163,

In a patient with protracted cholestasis and a secondary chronic inflammation, complete obstr tion of the bile duct occurred as a complicat due to inflammatory stenosis of the papilla. The obstruction was relieved by a T-drain whi furnished the opportunity to study the relati of increased pressure in the bile ducts to ser levels of some enzymes by clamping off the T-

most rapid and greatest response to a decreased
e drainage with a pressure increase in the
e duct from 10 to over 30 cm H_2O was in the
um level of glutamic dehydrogenase which in-
ased to 3 times resting level or 200% within
r. after the pressure rise. Serum levels of
aline phosphatase, SGOT, SGPT, and a bilirubin
c. showed little increase, if any, above nor-
values. Some enzymes had moderate increases
serum levels as a result of increased biliary
ssure; these were aldolase, malic dehydrogenase,
phosphoglycerate kinase; altogether, the
um conc. of 10 enzymes was determined. Others,
h as leucine aminopeptidase and sorbitol de-
rogenase, had minimal variations from the
ting values. These findings corroborate the
ue of determining glutamic dehydrogenase levels
serum in the early diagnosis of biliary ob-
uction.

6 EXPLORATION OF THE COMMON BILE DUCT
WITH VAN BUREN SOUNDS. (E.) Meyerowitz,
R. (Albert Einstein Coll. Med., Bronx, N. Y.).
r. *J*. *Surg*. 113(6):861, 1967.

Van Buren type urethral sound is widely used
Britain for exploration of the common bile
t, and is said to be more advantageous in this
than is the Bakes' dilator employed in the U.S.
Van Buren sound allows the surgeon a better
d, and gives him more control of the instrument.
also affords full contact with the entire length
the duct, whereas the Bakes' dilator can con-
t only one segment at a time. In addition to
sound's exploratory use, it simplifies trans-
denal sphincterotomy by allowing the surgeon
cut down on it while it is held firmly in place
h its tip protruding through the ampulla of
er.

7 THE ESTABLISHMENT OF CHOLEDOCHODUO-
DENOSTOMY WITH THE AID OF A SPECIAL AP-
ATUS. (Rus.) Ryneiskii, S. V. (Fac. Clin.
g., 2nd Moscow Med. Inst.) and Iu. I. Morozov.
rurgiia (*Moskva*) 43(2):115-117, 1967.

189 choledochoduodenostomies, a mechanical
ure was used on 9 patients (8 women, 1 man;
76 yr. old); 6 of these had mechanical jaundice,
4 had purulent cholangitis. All of the pa-
nts had a preliminary cholecystectomy. Using
NZhKA apparatus, the technic was as follows:
lodochotomy was made at the extreme end of the
denum by a small incision through which the
mon bile duct was sounded, concretions were
racted and the opening in Vater's papilla was
lored; the intestinal wall adjacent to the
ning in the common bile duct was punctured
the suturing branch of one-half of the ap-
atus was pulled through the opening on the
e of Vater's papilla; the branch of the other
f of the suturing apparatus was introduced
ough the puncture in the duodenum. The walls
the common bile duct and duodenum were sutured
h 2 rows of clamps, and simultaneously the
lumen of the anastomosis was formed. The apparatus was returned to its initial position, the branches were separated and the apparatus removed. The two openings in the common bile duct and duodenum after imposing of the anastomosis were blended into one opening. The openings which conducted branches of the apparatus were sutured with 2 rows of nodular silk sutures. The anastomosis was almost entirely located in the retroduodenal space and it usually included the pancreatic part of the common bile duct. Contraindications for use of this apparatus are at the high position of the liver, at narrow and deep surgical approaches of introduction of branches of the apparatus into the duodenum and, especially, into the common bile duct. Each patient had an X-ray 4-7 days after operation. A severe postsurgical period, complicated by pneumonia, cardiovascular insufficiency and cystitis, was noted in only one 76-yr.-old female patient. All patients were released in good condition an av. of 23 days after surgery. One case history is presented in detail.

9668 ETIOLOGY OF INTRAHEPATIC CYSTS OF BILE DUCTS. (Ger.) Ehrhardt, G. (Friedrich Schiller U., Jena, Germany) and R. Schiewe. *Zbl*. *Allg*. *Path*. 110(2):119-126, 1967.

A 45-yr.-old female patient underwent cholecystectomy with revision of the bile duct, for obstructive jaundice with simultaneous pancreatitis. Concretions were not found in the gallbladder or in the duct. Histologically, there was chronic cholecystitis with a decreasing pericholecystitis. On the seventeenth postoperative day cholangiography was performed through the T-drain revealing an empty space in the right hepatic lobe the size of a hen's egg. It was deemed a cyst of the intrahepatic bile duct when the serological test for *Echinococcus* proved negative. The postoperative course was uneventful. The patient was readmitted 8 mo. later with intermittent obstructive jaundice. Upon re-operation the patient was found to have a fist-sized adenocarcinoma in the portal region of the liver, the origin of which could not be determined. The patient died of fulminating tumor 3 wk. later. Found at autopsy were: In the right lobe of the liver, a liver cyst 8 x 8 x 9.5-cm reaching the liver capsule; thickness of the cyst wall 3-5 mm. Cyst contents were crumbling bile solids and a solitary pigmented cholesterol-lime stone; the walls and roof of the cyst were infiltrated by the tumor with full destruction. A right-sided intrahepatic bile duct terminated in the floor of the cyst with also a broad connection to the right hepatic duct proper. At the juncture of the right and left hepatic ducts there was an open abscess perforating the portal region into the duodenum, involving also the pylorus of the stomach with the bed of the gallbladder. The tumor invaded the common bile duct with destruction and complete obliteration of the lumen and infiltrated the hepatoduodenal part of the small omentum walling up the distal 3-cm of the bile duct. Carcinoma tissue in the pancreas partially blocked the duct. Other metastases were in para-aortal lymph nodes, pleurae and both lungs. Small and large knots of metastasing tissue were in the liver. Histologically, the cancerous tissue was a mature solid adenocarcinoma. The cyst wall showed cylindrical epithelial cells in places; no smooth muscle fibers were to be seen but there were abundant neural fibers, and mucous glands. Only 5 such cases have been previously reported in the literature.

9669 TRANSHEPATIC DRAINAGE OF THE BILIARY TRACT. (Fr.) Pomidori, A. (Fac. Med., Naples, Italy). Lyon Chir. 63(1):21-26, 1967.

Following biliary surgery (removal of calculi, sphincterotomy, biliodigestive anastomosis, etc.), a 23-cm polyethylene tube (usually 1-1.5-cm diameter) with a slightly curved end was introduced through the common bile duct into the right hepatic duct and then through the hepatic parenchyma, with an external opening in the lateral thoracic or axillary area. After edema or dilatation of the bile ducts subsided and tonus returned to normal (8-18 days later) the drain was removed. Three patients were treated in this way and are described briefly. Transhepatic drainage of this type is recommended particularly for patients undergoing surgery of the papilla of Vater, when transpapillary drainage is impossible and/or dangerous. No postoperative complications were noted; the 3 patients were discharged in good condition 2 or 3 days after the drains were removed.

9670 RESULTS OF OPERATIONS ON THE BILE DUCTS. (Ger.) Herzog, K. H. (U. Clin. Rostock, Germany), E. Smolinski and S. Kiene. Bruns. Beitr. Klin. Chir. 214(3):338-348, 1967.

A report is made on 604 operations on the biliary system, 493 in women (81.6%) having an av. age of 45.2 yr., and 111 in men (18.2%), av. age 52.5 yr. The medical records of 182 patients have been retained for more than 5 yr. More than half the patients had suffered biliary symptoms for over 3 yr. A total of 344 had undergone 1-4 different medical treatments in hospital and 181 ambulatory patients had been under physicians' care for more than 3 yr. Typical stone colic in simple and aggravated form was the chief complaint recorded; 428 patients had suffered at least intermittent colic-like attacks; 106 of these cases also had jaundice; and in 50 cases, pancreatitis. The patients had undergone various other diseases and operations prior to the one on the biliary system. Intraoperatively, stones were found 559 times in the gallbladder and 103 times in the main bile ducts. Inflammation of the gallbladder occurred in 310 and of the bile ducts in 18. Macroscopic evidence of pancreatitis appeared in 14; 4 cases of hepatitis and 1 of hepatic cirrhosis were verified; there were 16 cases of papillary stenosis; 13 tumors were encountered, 5 in the gallbladder and 4 i the ducts; 1 was on the papilla, 1 on the head of the pancreas, and 1 on the liver. The oper tive procedures resulted in 271 simple chole cystectomies, 163 cholecystectomies with choledochotomy and exploration of the main ducts. T-drain was placed in the common bile duct 159 times; the primary duct had to be closed by su 4 times. A number of other special technics h to be employed, as an example, in 13 patients biliodigestive anastomoses were constructed. postoperative period was passed without compli tions in 458 cases; 60 suffered general compli tions, 68 local complications and 18 both. General complications were pneumonia, pleuriti thromboemboli and the like. Local complicatio involved disturbances in wound healing. The primary mortality was 3.14%, due in part to bi digestive anastomoses some of which required a second surgical intervention, increasing the r Sometime later a questionnaire was sent to all patients; 425 answered; 214 were without any troublesome symptoms; 279 could eat all foods.

9671 MECHANISM OF JAUNDICE DUE TO BILIARY OBSTRUCTION AFTER 4 DAYS. (Fr.) Mallet-Guy, P. (Edouard-Herriot Hosp., Lyon, France), J. Michoulier, L. F. Kesner and M. Nugeyre. Lyon Chir. 63(1):17-20, 1967.

Chicago Blue was inj. in the common bile duct of dogs under pressure of 30-cm H_2O. In the f hr. following common bile duct obstruction, it was noted that biliary pressure and bilirubin the thoracic duct rose rapidly, while serum bilirubin rose slowly; following removal of th obstruction, lymph and serum bilirubin were re progressively. Thus, it appears that the lymp compartment serves as an intermediary between the biliary and blood systems. In another ser of research, biliary-lymphatic passage was stu 4-8 days after the common bile duct obstructio utilizing again the Chicago Blue; there was no reflux of dye from the biliary into the lympha system when the common bile duct was subjected pressures of 40-cm H_2O, and only in 25% of cas there was reflux into the lymphatic system und a pressure of 60-cm H_2O. Thus, it appears tha the permeability of the biliary-lymphatic syst is the essential mechanism of jaundice, but th mechanism is inoperable when pressures with th common bile duct are within normal limits, e.g 30-40 cm H_2O.

9672 BLOOD-VOLUME AND HYPOTENSION IN OBSTRUCTIVE JAUNDICE. (E.) Cattell, W. R. (St. Bartholomew's Hosp., London) and M. Birnstingl. Brit. J. Surg. 54(4):272-278, 196

Blood vol. studies carried out on 25 patients and on 17 dogs with obstructive jaundice are described here to find what evidence there is blood-vol. deficits such as have been describe in this condition. The effect of hemorrhage o mean systemic pressure in jaundiced, compared

nonjaundiced animals, was studied on 20 dogs.
umans, the measured blood-vol. exceeded the
icted blood-vol. in 11 of the 14 patients. In
als no significant difference was demonstrable
he jaundiced compared with the nonjaundiced
plasma-vol. and blood-vol. were expressed
l/kg body wt. The effect of hemorrhage on
systemic pressure varied in individual dogs,
a mean reduction occurred. It was concluded
an increased predisposition could be demon-
ted in animals with obstructive jaundice after
er blood losses than 30% of total blood vol.,
h does not explain the observed high incidence
ypotension in surgery patients with obstructive
dice who have lost little blood, so that no
d rationale exists for pre-operative blood
sfusions in such cases.

ACTION OF VARIOUS NEW ANALGESIC DRUGS ON THE HUMAN COMMON BILE DUCT. (E.)

on, D. S. (Manchester Roy. Infirm., England)
H. B. Torrance. Gut 8(3):296-300, 1967.

sure changes in the common bile duct were
ured in postcholecystectomy patients following
n. of levorphanol, dextromoramide, dextro-
oxyphene, phenoperidine or phenazocine. Re-
s were compared with pressure rises produced
.m. admin. of morphine and pethidine. Pres-
changes were graded as marked (10-cm or more),
rate (5-10-cm or more), minimal (less than
) and no change. Both levorphanol and pheno-
dine in doses of 2 mg i.m. were comparable
10 mg i.m. of morphine. Dextropropoxyphene
n. produced no changes in biliary pressure
was considered comparable with codeine.
romoramide in doses of 5 mg i.m. was comparable
10 mg i.m. of morphine. Phenazocine was
idered stronger and safer in treating biliary
than morphine with doses of 2 mg i.m. of
former being stronger than 15 mg i.m. of
hine.

PARA-VATERIAN DIVERTICULA AND THEIR RELATIONSHIP TO BILIARY TRACT DISEASE.

.) Friedman, E. (Cent. Emek Hosp., Afula,
el). Harefuah 72(5):172-179, 1967.

08 cases of duodenal diverticula diagnosed
-ray, 53 were para-Vaterian. Av. age was
r. and number of males and females was equal.
5 undergoing X-ray examination (p.o., i.v. or
) of the biliary tract, biliary tract disease
observed in 11. Av. age of those with disease
66; of those without, 50. Of 55 who had duo-
l diverticula other than para-Vaterian, biliary
t disease was diagnosed in only 4. Of the
ith biliary tract disease, there were 5 males,
males and the duration of complaints was
yr., except only briefly in 1. The chief
laint was recurrent pain in the right upper
men. Jaundice was transitory in 2 of 3 cases
hich it occurred. In the 1 case of acute
reatitis, an apparently healthy gallbladder
removed. Of 7 patients operated on, 6 had a dilated common bile duct, and 3 of these had calculi in both the bladder and the common duct, 1 only in the bladder, and 2 had no calculi. In all but 2, the para-Vaterian diverticuli were demonstrated preoperatively, in 1 during intraoperative cholangiography and postoperatively in the other. In 2, the common bile duct entered the diverticulum at the base of its neck. The coincidence of para-Vaterian diverticula and biliary tract disease was common, being 44% of those with biliary tract disease in this study as opposed to 20% of the whole group. It is suggested that every patient above age 50 in whom a para-Vaterian diverticulum is found on upper gastrointestinal examination should have a full biliary tract examination, even if complaints seem to be due to other causes.

9675 LIVER IN CONGENITAL BILE DUCT ATRESIA: HISTOLOGICAL CHANGES IN RELATION TO AGE.

(E.) Shiraki, K. (U. Tokyo), M. Odawara, M. Higurashi and Y. Okamoto. Paediat. Univ. Tokyo (12):68-78, 1966.

Liver histological examination was made in 51 cases of congenital bile duct atresia in pediatric patients. Specimens (52) were fixed in 10% formalin, and stained with hematoxylin and eosin, periodic acid-Schiff and van Giesson-Elastica stains. Giant cells were observed in 33 of 52 specimens (63%) and in 31 of 39 (80%) obtained before 5 mo. of age. Several giant cells contained 40 nuclei, and 24 of 52 (46%) had more than 10. The max. number of nuclei decreased with increasing age, with a peak at 2-4 mo. Bile duct hyperplasia was observed in 49 (94%) and increased in parallel with age until 5 mo. when it diminished as fibrous tissue increased in the portal area. There was essentially no difference in degree of bile duct hyperplasia between correctable and non-correctable bile duct atresia. Degree of bile stasis in the portal area increased with age until 6 mo. There was no correlation between the degree of intra- and intercellular bile stasis and age. There was a significant regression between degree of fibrosis (measured planimetrically) and age, to 6 mo. of age. There was no relation between degree of fibrosis and age. Those with severe fibrosis were all above 3 mo. of age. There was no difference in degree of fibrosis between correctable and noncorrectable bile duct atresia. There was a statistically significant correlation between degree of fibrosis and thymol turbidity test and zinc sulfate turbidity test. High test levels were indicative of severe fibrosis, but normal values did not imply slight fibrosis. Neither serum bilirubin, serum total cholesterol, alkaline phosphatase, total protein nor serum albumin:globulin ratio correlated significantly with degree of fibrosis. Livers of those with correctable atresia had a slight degree of bile stasis in the portal area and a slighter tendency toward giant cell transformation. It is suggested that these age-related histological changes should be considered when making a liver biopsy diagnosis of patients with prolonged obstructive jaundice.

9676 SIGNIFICANCE OF ALLERGY IN THE PATHOGENESIS OF HEPATITIS AND CHOLECYSTOANGIOCHOLITIS. (Rus.) Podobedov, V. B. (Med. Inst., Kiev, USSR). *Vrach. Delo* (11):11-14, 1966.

A study was made of 103 patients with hepatic cirrhosis, chronic hepatitis with or without pronounced symptoms of cholecystitis and angiocholitis, cholecystitis and angiocholitis with slight symptoms of hepatitis, or liver and bile tract pathology superimposed upon allergy (drug allergy, urticaria, bronchial asthma); 60 had allergic symptoms and 40 of these were studied in detail. The Widal's-Vogan test was positive in 18 of 22 subjects tested, i.e., WBC was decreased by more than 1000, 12 had tachycardia, 1 had paroxysmal tachycardia, some had heat reaction, vertigo and urticaria, and infrequently Quincke's edema. Twelve patients with drug allergy (on antibiotics, aminopyrine, sulfanilamides, hormones, bromine, iodine) improved on desensitizing therapy. The Boyden reaction revealed the presence of antibodies in liver tissue in 22 of 24 patients studied. In 12 patients examined, the eosinophil content varied from 6-90%. A general blood study revealed more than 4% eosinophils in 16 of 40; less than 24% lymphocytes in 12 of 40 and more than 30% in 15 of 40; less than 6000 WBC were found in 25 of 40, less than 4000 in 3 of 40, and the RBC sedimentation rate was more than 12 mm/hr. in 7 of 40; globulins were increased in 40 of 40 (particularly the γ-fraction). A slight liver function disturbance was evident in 26 of 40, moderately severe disturbance in 12 of 40, and marked changes in liver function were present in 2 of 40. Desensitizing therapy yielded subjective and objective improvement.

9677 CHOLECYSTITIS TREATED WITH PYRIDINE-3-CARBOXYLIC ACID-HYDROXYMETHYLAMIDE (BILAMID). A STUDY OF 588 PATIENTS ADMITTED FOR TREATMENT OF BILIARY TRACT DISORDERS. (Dan.) Martiny, P. J. (Holstebro Cent. Hosp., Denmark) and K. Baldvinsson. *Ugeskr. Laeg.* 129(13):419-421, 1967.

A total of 558 patients were surgically treated over a 10-yr. period, 302 for cholecystitis, and 256 for cholelithiasis; of the 302 cases of cholecystitis 168 received Bilamid (pyridine-3-carboxylic acid hydroxymethylamide) therapy (2 x 3 tablets/day for 2 days then 1 x 3 tablets/day) for 40 days each; of the 256 patients with cholelithiasis, 37 received Bilamid treatment in the same dosages, but for only about 25 days. A total of 134 cases of cholecystitis and 219 of cholelithiasis did not receive Bilamid. Altogether those with cholecystitis treated with Bilamid were in the hospital 8 days fewer than those who did not receive the drug. Cholelithiasis patients with the drug spent 4 days less in hospital. It is concluded that although the number of patients was small, Bilamid seems to exert a beneficial effect. The mode of action of the compound is unknown; it does in some instances reduce fever. An investigation is underway with a larger number of patients in attempt to discover its mode o
action.

9678 THE DIFFERENTIAL AND DIAGNOSTIC SIG
NIFICANCE OF PERIDURAL BLOCKADE IN
ACUTE CHOLECYSTITIS AND CHOLECYSTOPANCREATITI
(Rus.) Nosov, G. E. (Vladivostok Med. Inst.,
USSR). *Vestn. Khir. Grekov.* 98(4):65-70, 196

Extradural (peridural) blockade, performed on
dogs, regularly increased bile secretion with
change in the chemical composition of the bil
admin. of morphine markedly decreased bile se
tion, which had increased on extradural block
The latter released spasm of the sphincter of
induced by morphine. A study of 25 cadavers
that puncture of the extradural space is easi
between the twelfth thoracic vertebra and the
first lumbar vertebra, and that admin. of 50
of anesthetic soln. with patients in the late
position provides blockade of the spinal nerv
and sympathetic ganglions to the required ran
(up to the sixth-seventh thoracic segment).
an extradural puncture by a slightly-modified
Seit-Umerov technic, and using a blockade sol
of the following composition: 0.25% novocai
0.3% tetracaine, 5% aminopyrine and 0.1% epi
rine, was applied to 100 patients with acute
cystitis and 38 patients with cholecystopanc
tis (129 females, 9 males; 40-61 yr. old) for
purposes of differential diagnosis and treat
In all, 44 patients had an obvious and persis
improvement after blockade, and they were re
after 8-10 days. This type of blockade is v
useful in the treatment of *Lamblia* cholecyst
In 21 of 65 conservatively-treated patients,
therapeutic effect of extradural blockade wa
slight, brief or absent, but all refused sur
shortly after release, however, surgery was
formed on 8 of 21 due to exacerbation. Of 1
observed, 73 (5 males, 68 females) had surge
primary cholecystitis was found in 27, recur
cholecystitis in 46; and stones were present
and absent in 5 patients. Cholecystectomy w
performed in 54, and cholecystostomy in 3 pa
The gallbladder showed phlegmonous changes i
gangrenous in 14 and catarrhal changes in 2
Extradural blockade at the peak of seizure h
no effect in 21 of 73 patients and induced b
reduction (3-4 hr.) of pain in 52 of 73. Th
extradural blockade in acute cholecystitis i
reliable method for differential diagnosis a
allows more accurate indications for surgery

9679 MINEROLOGY OF GALLSTONES. (Ger.)
Mosebach, R. (Justus Liebig U., Gi
Germany). *Gastroenterologia (Basel)* 107(1):
1967.

Gallstones from 145 cholelithiasis cases wer
studied minerologically for composition,
structure and interrelationships, including
studies of powder and thin sections under th
polarization microscope. X-ray diffraction
studies were made of powdered gallstones.

tones were subjected to quantitative chemical
ses to determine their composition; the
cal integration in concrements required split-
polishing and grinding, dessication, soln.
ecrystallization to determine in what stages
equences the stones were formed. Cholesterol
different crystalline forms, optically dif-
tiated have appeared; 2 of these were found
single large concrement from a 60-yr.-old
nt. Analysis showed that the largest com-
ts of gallstones are lipids, cholesterol
the principal one followed by fat, bile acids,
ubin (usually a minor amount); Ca is present
ly in the form of carbonate; very little
hate was present. There are 3 types of
tones; the first is spoken of as a mulberry
spberry stone (22%); the most common type
is a concrement generally flat-sided bounded
gles and corners; these are often designated
ceted, but which the author prefers to call
edral; the third type (19%) is more or less
ical, ellipsoidal or completely irregular
tones. As a rule the mulberry or raspberry
has a relatively low wt. and a relatively
diameter and is a single concretion with
w-to-brown and even green colors. The thin
on showed a peculiar structure which the
r has seen in all raspberry stones; this
ture is formed of small spherical or ellip-
l bodies which at once form concentric shell-
ed structures and rays of crystalline chol-
ol radiating from the center. The polyhedral
when cut and polished, clearly showed that
der generation of raspberry stones had grown
a polyhydral one.

PERSISTENT, POSTOPERATIVE, ISOLATED
DILATATION OF THE PRINCIPAL BILE DUCT,
TRIBUTORY FACTOR IN SECONDARY FORMATION OF
S. (Fr.) Mallet-Guy, P. (Fac. Med.,
France) and M. Gignoux. Lyon Chir. 63(3):
31, 1967.

ilatation of the main biliary duct has been
ved as the only apparent cause of the post-
cystectomy syndrome in 25 cases; now 9
ementary observations indicate a new dimension
nsequence of such dilatation, the secondary
pitation of a lithiasis in the duct. All
were operated upon with manometric and
logic control giving an absolute proof of
ce of obstruction in the duct. Formation of
in this situation was probably caused by
stasis. It is stated that choledochoduo-
tomy is especially indicated in these aspects
mmon duct lithiasis, and even in the dilata-
alone. Clinical evidence and radiological
es seem to justify such a procedure which is
nly one giving a reduction in the diameter
e duct and preventing stasis. Re-operation
elapse of cholecystectomy attained an im-
nt percentage in the practice of 1 of the
rs reaching 27%, 133 cases of stone in the
duct in 492 operated patients.

9681 RELATIONSHIP OF CHOLECYSTOGRAPHIC VISUALIZATION OF GALLBLADDER TO INCIDENCE OF CHOLEDOCHOLITHIASIS. (E.) Woolam, G. L. (Mayo Clin., Rochester, Minn.), F. J. Freeman and J. T. Priestley. Surgery 61(5):669-671, 1967.

Although the interpretation of roentgenologic findings has been among the usual criteria for deciding the feasibility of exploratory choledochotomy any additional information indicating the likelihood of choledocholithiasis is useful. The present study determined the relative incidence of choledocholithiasis when cholecystographic findings indicated a functioning gallbladder with stones, compared with the incidence with a nonfunctioning gallbladder. The records of 500 consecutive patients who had undergone elective cholecystectomy during 1965 for chronic cholecystitis with cholithiasis were examined. Patients with jaundice, or with a history of jaundice, were excluded from the study. Cholecystography, with oral admin. of iopanoic acid (Telepaque), had been performed preoperatively at least once on all patients. Common duct stones were found in 5.4% (27 patients). Among the 361 patients with gallbladders which had been visualized by preoperative oral cholecystography, the incidence of choledocholithiasis was 3% (12 patients). Among the 139 patients with nonvisualization of the gallbladder, common bile duct stones were found in 11% (15 patients). The fact that choledocholithiasis is more commonly present in patients with nonopacifying gallbladders should be helpful in scheduling surgical exploration of the common ducts.

9682 CLASSIFICATION OF PARIETAL DYSPLASIAS OF THE GALLBLADDER. (It.) Cataliotti, F. (U. Palermo, Italy), L. Li Castri Patti and U. Parodi Giusino. Minerva Chir. 22(6):344-357, 1967.

In a series of 503 cholecystographic examinations, five patients (4 women and 1 man; age 30-60 yr.) with parietal dysplasia of the gallbladder without gallstones were observed. These patients represent 1.4% of 346 patients of the same series subjected to cholecystectomy. Histologically, all patients showed mucosal hyperplasia with papilla-like structures and elements of adenomyomatosis. Sex distribution (female:male ratio 4:1) was similar to that reported by other authors. All patients were subjected to cholecystectomy and disappearance of symptoms followed; follow-up was 2 yr. in 3 patients and 1 yr. in the other 2. In a statistical study of the incidence of dysplastic lesions of the gallbladder in patients with gallstones, only 2 cases (1 with adenomyomatosis of the fundus and 1 with intramural diverticulosis) were observed among 100 gallbladders examined. The authors recommend that the term "cholecystosis" be applied only to dysplastic parietal lesions of the gallbladder. The correct interpretation of radiological and cholangiographic data in the differential diagnosis of parietal dysplasias, as well as their medical and surgical treatment, are discussed.

9683 CARCINOMA OF THE GALLBLADDER AND THE BILE DUCTS.

(Ger.) Burckhart, T. (City Hosp., Russelsheim, Germany) and D. Loew. Bruns Beitr. Klin. Chir. 214(3):314-337, 1967.

In 2204 operations on the bile ducts, 63 cases (2.8%) of carcinoma of the gallbladder and 45 cases (2.0%) of carcinoma of the bile ducts were observed; women (59) predominated in gallbladder carcinoma, whereas the number of women with carcinoma of the bile duct was 22 and the number of men 23. The majority of patients were 55-65 yr. old with an av. age of 62 yr. Of the 63 gallbladder carcinoma cases, 46 were histologically verified, as were 36 of the bile duct carcinoma cases; 94.4% gallbladder cases were adenocarcinoma as were 80.4% of the bile duct carcinomas, anaplastic carcinoma occurred in 2.8% of the gallbladder carcinoma and 13.0% of the bile duct carcinomas. Squamous epithelial carcinoma made up the remainder. The primary site of gallbladder carcinoma is not always discernable; mostly it arises in the fundus, in the neck of the bladder or in the wall adjacent to the liver; there are 2 forms, a diffuse infiltrating type which spreads faster, and a knot-like, compact and circumscribed form. The gallbladder carcinoma of the fundus shows the greatest metastatic distribution (colon, small intestine and forward abdominal wall, lymphatics, vascular structures and nervous system). The bile duct carcinoma was located about the hepatic bifurcation of the duct, the mouth of the gallbladder and in the duct below the gallbladder; the forms were villous, nodular or diffuse. The metastases can occur in the same regions as those of gallbladder carcinoma; growth of bile duct carcinoma is slower. Gallbladder carcinoma showed metastases in 85% of cases; bile duct carcinoma had metastasized in 70%. Symptomatology and diagnosis presented difficulties: Right-sided upper abdominal diffuse pain occurred in 58.7% of gallbladder cases and 42.2% of bile duct cases. Jaundice was present in 57.1% of gallbladder carcinoma, and 91.3% of bile duct. Colic occurred in 41.3% of the former, and 4.3% of the latter. Loss of appetite and body wt., a feeling of illness and emesis were other indications. Increased sedimentation rate was useful; serum bilirubin (in the region of 20 mg%) is indicative. Liver function tests were useless. X-ray examination proved helpful in 7 of 27 cases. Etiology and genesis of these cancers is not clear. The prognosis in both types of carcinoma is not good because of rapid early growth, the frequent delay in correct diagnosis and the tendencies to metastasis. The longest survival after operation for bile duct carcinoma has been 1 yr. One case of gallbladder carcinoma has survived 3.5 yr., another 5.5 yr.; all others survived less than 1 yr.

9684 CHOLECYSTOKININ IN X-RAY EXAMINATIONS.

(Sw.) Backlund, V. (City Hosp., Kiruna, Sweden). Lakartidningen 64(24):2473-2476, 1967.

The author instituted the use of cholecystoki
in place of egg yolk or a fat meal to stimula
contraction of the gallbladder and noted 2 o
actions of the hormone in the course of trea
400 patients having well-filled gallbladders
no concretions. About 50% of the cases retu
to normal gallbladder function; the others d
veloped some degree of pathology such as poo
filling with contrast material, impaired ton
no filling with contrast material, or the fo
of concretions; these conditions represented
forerunner of possibly severe pathologies wh
could be prevented by return to normal funct
through proper treatment. The rate of passa
of Ba contrast material in the small intesti
was much increased without any discomfort to
patient; however, this effect was so variabl
no practical use could be made of it. The
author's technic consists of emptying the st
of contrast material in the recommended mann
having the patient lie on his right side for
min. following X-ray examination of the stom
(providing that pyloric stenosis is not pres
The cholecystokinin (35 Ivy dog U in 5-10 ml
iological saline/adult, 20 Ivy dog U/child,
yr. old) is then inj. i.v. The contrast med
is carried to the cecum within 5-15 min. as
pared to the usual time of 2-8 hr. in normal
dividuals. These 2 effects are interrelated
was demonstrated in 186 patients (70 men and
women), undergoing X-ray examination of the
stomach. After lying on the right side for
min. each patient was inj. with cholecystoki
X-ray films were taken of the abdomen 5, 10,
and 20 min. after inj. and then, when necess
hourly. The passage of the small intestine
curred within 20 min. in 139 cases (58 men a
81 women); 47 had passage times of 1 hr. (1
or more. These 47 showed 1 or more patholog
conditions of the biliary tract, including s
or no filling of the bladder, stones, and/or
muscular contraction. The underlying factor
the production of these effects are unknown.
Within limits, the effect on passage of cont
material was proportional to the amount of h
mone inj.

9685 EFFECTS OF SELECTIVE VAGOTOMY ON T MORPHOLOGY AND FUNCTION OF THE GALLBLADDER AND PRINCIPAL BILIARY TRACT.

(I
Misiti, G. (S. Salvatore Hosp., Rome), B. Sb
and S. Broglia. Gazz. Int. Med. Chir. 72(8)
662, 1967.

Cholecystocholangiographic examinations were
ducted before and 2-6 mo. after surgery in 8
patients with gastroduodenal ulcer in order
ascertain the effects of selective vagotomy
the gallbladder and principal bile ducts. S
tive anterior and truncular posterior vagoto
performed in 21 patients (Group 1); gastroen
ostomy was associated in 11 patients and pyl
plasty (9 Heineke-Mikulicz; 1 Finney) in 10.
Selective anterior and posterior vagotomy wa
performed in 59 other patients (Group 2);

roenterostomy was associated in 18 and py-
plasty (39 Heineke-Mikulicz; 2 Finney) in 41.
rged gallbladders were observed in 71.6% of
ents of Group 1 and in 45.7% of Group 2. The
est incidence of enlarged gallbladder (42.9%)
observed in patients of Group 1 subjected to
roenterostomy. The high incidence of enlarged
bladders following selective anterior and
erior vagotomy is probably due to accidental
ioning of, or operative trauma to, the hepatic
of the vagus. The gallbladder showed no
ge after surgery in 23.6% of patients of Group
d 49.1% of those of Group 2. Enlargement of
principal bile ducts after surgery was seen
3.6% of patients of Group 1 and 6.6% of those
roup 2; no change in the principal bile ducts
r surgery was observed in 71.5% of patients
roup 1 and 88.3% of those of Group 2, but
difference is not statistically significant.
ite the high percentage of gallbladder and
duct alterations revealed radiologically,
esponding clinical symptoms were not observed
hese patients.

SELECTIVE VAGOTOMY OF THE LIVER AS
PREVENTION AND CURE OF DISEASES FOLLOWING
RPATION OF THE GALLBLADDER. (Ger.) Iliescu,
lexandru-Sahia Hosp., Bucharest, Rumania).
Chir. 92(19):661-665, 1967.

ncidence of complications, such as chronic
reatitis, liver pediculitis, chronic Odditis,
ic hepatitis and spasm of the sphincter of
following surgical removal of the gallbladder
lved about 33% of the patients undergoing
operation. In 2 yr. more than 40 chole-
ctomies with selective vagotomy of the liver
been performed. Postoperative courses have
benign and symptom-free: Pain, subicterus
angiocholitis and other sequellae have literally
ppeared. There has been only 1 exception,
to a stone in the bile duct removed by chole-
otomy. The method is effective in operations
associated disorders of the biliary tract.
selective vagotomy of the liver is simply
ied out: the motor plexus to the biliary
em lies in the region of the lesser omentum
s easily found; the cranial portion of the
er omentum, associated with the left lobe of
liver, bears the nerve fibers (1) of the left
s. In the caudal region of the lesser omentum
the recurrent rami (2) of the gastrohepatic
e and a large portion of the celiac rami (3)
ront of the gastroduodenal artery and above
pancreas. The nerve bundle (4) accompanying
blood vessel from the pylorus to the upper
of the duodenum and the ventral plexus (5)
ciated with the gastroduodenal artery are
involved. All the above structures (1-5)
cut. Some fibers from the right vagus through
celiac ramus are still intact; they apparently
ot innervate the biliary tract with motor
rs. This selective vagotomy does not affect
ric function.

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GASTROENTEROLOGY

ABSTRACTS AND CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology had accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Gr.	Greek	Pol.	Polish
Ar.	Arabic	Heb.	Hebrew	Por.	Portuguese
Bul.	Bulgarian	Hun.	Hungarian	Rum.	Rumanian
Ch.	Chinese	Ic.	Icelandic	Rus.	Russian
Cz.	Czech	In.	Indonesian	Ser.	Serbo-Croatian
Dan.	Danish	It.	Italian	Sl.	Slovene
Dut.	Dutch	Jap.	Japanese	Sp.	Spanish
E.	English	Kor.	Korean	Sw.	Swedish
Eston.	Estonian	Latv.	Latvian	Th.	Thai
Fin.	Finnish	Lith.	Lithuanian	Turk.	Turkish
Fr.	French	Maced.	Macedonian	Uk.	Ukrainian
Ger.	German	Nor.	Norwegian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	µM	micromolar
admin.	administered, administration	max.	maximum, maximal
ADP	adenosine diphosphate	mc,µc	milli-, microcurie(s)
ATP	adenosine triphosphate	mg	milligram(s)
approx.	approximately	min.	minute(s)
av.	average(d)	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
°C	degrees centigrade	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose
CNS	central nervous system	ng	nanogram (10-9)
conc.	concentrate(d), concentration(s)	pg	picogram (10-12)
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes)
µg	microgram(s)	resp.	respectively
hr.	hour(s)	Rev.	review (only in cite)
i.m.	intramuscular	RNA	ribonucleic acid
inj.	injected, injection(s)	s.c.	subcutaneous
i.p.	intraperitoneal	sec.	second(s)
I.U.	international unit(s)	SGOT	serum glutamic-oxalacetic transami
i.v.	intravenous	SGPT	serum glutamic-pyruvic transaminas
kg	kilogram(s)	soln.	solution(s)
LD_{50}	median lethal dose(s)	U	unit(s)
LDH	lactic acid dehydrogenase	UV	ultraviolet
m	meter(s)	vol.	volume
M	molar	WBC	white blood cells (leukocytes) or count
mEq	milliequivalent(s)	wk.	week(s)
mM	millimolar	wt.	weight(s)

yr. years

8 IN VIVO OBSERVATIONS ON MICROCIRCULATION
IN THE SPLANCHNIC REGION FOLLOWING
NEPHRINE STIMULATION. (It.) Bellodi, G. (U.
ma, Italy) and P. Sartoni. Riv. Gastroent.
3):156-168, 1967.

e Wistar rats (wt. 250 g) were subjected to
arotomy and a cannula inserted into the ascend-
vena cava. At this point, circulation at the
el of the hepatic sinusoids and pancreatic
illaries was directly observed by means of a
ocular microscope equipped with a special il-
inating lens and a Zeiss Ultropak objective
s with a magnifying power of 110, 180, and 230
es. Observations were repeated after inj. into
cannula of 0.1-0.2 ml of a 0.2% soln. of
nephrine. At the external surface of the
er, under normal conditions, the blood vessels
ich correspond to the subcapsular sinusoids)
e numerous and of various diameters, arranged
a linear, parallel, pattern; smaller vessels
ted to form larger ones, which then continued
p into the parenchyma; blood seemed to flow
m the deeper portion of the organ, where the
usoids were tortuous and formed many anasto-
es; RBC moved at high speed and freely within
large vessels. After the inj. of epinephrine,
eaction phases were observed: in Stage 1,
sinusoid walls collapsed, blood flow was
ter, and few RBC were seen within the blood
sels; in Stage 2, progressive increase in
ber and massing of RBC was observed along with
arked decrease in blood flow, frequently caus-
death in the animals. In surviving animals,
culation returned to normal within 10-20 sec.
animals treated with a second dose of epin-
rine, the reduced RBC flow stage was always
dent, although the dilatation stage was less
ked. Under normal conditions, the blood ves-
s of the pancreas were directed from the peri-
ral portion of the gland towards the center;
y were usually of very small diameter and
tuous; blood flow was always lively, with
stant and continuous, if not very rapid, RBC
w. After epinephrine, marked vasoconstriction
observed in pancreatic blood vessels; capil-
ies were emptied in a short time, with occas-
al RBC passage; larger vessels also decreased
caliber but maintained a rapid blood flow.
effect was greatest after 3 min., and if the
mal survived, capillary circulation returned
normal.

9 ALBUMIN SURVIVAL IN PATIENTS WITH
MASSIVE SMALL-BOWEL RESECTION. (E.)
awer, S. J. (Boston City Hosp., Mass.), T.
skovic, R. Goldsmith, S. A. Broitman and N.
check. Amer. J. Dig. Dis. 12(8):753-760, 1967.

effect of removal of major portions of the
kimal and distal small intestine on albumin
radation was studied in 3 patients, 2-12 yr.
er resection. Most of the jejunum was resected
3 patients, and in 1 patient most of the ileum
was also resected. The half-life ($T_{\frac{1}{2}}$) of inj. ^{131}I-albumin in 4 controls was 8.7 days, with a range of 7.2-10.4 days. In an 18-yr.-old boy, who had 95% of the small intestine resected after a midgut volvulus, the half-life of inj. ^{131}I-albumin was 19.8 days, and in the second, a 22-yr.-old male who had 50% of the small intestine and right colon resected after an infarcted hiatus hernia, the $T_{\frac{1}{2}}$ was 17 days. The half-life was equally prolonged in both patients despite a low (2.2 g%) serum albumin in the first, and a low-normal (3.6 g%) serum albumin value in the second patient. The $T_{\frac{1}{2}}$ of albumin was normal in the third patient, who had recurrent gastric ulcers, atrophic gastritis and gastric mucosal bleeding; this 51-yr.-old female had 85% of the small intestine resected as a result of trauma to the superior mesenteric blood vessels during surgery for removal of cancer of the colon. A $^{51}CrCl_3$ study showed slightly abnormal values in this patient, which suggested excess gastrointestinal protein loss, and this may have compensated for a prolonged albumin half-life. These studies emphasize the greater importance of the jejunum as compared to the ileum in albumin catabolism, since prolongation of ^{131}I-albumin half-life was related to resection of the jejunum and not the ileum.

9720 REACTION OF THE NEWBORN ANIMAL TO DRUGS. PRELIMINARY COMMUNICATION. (I) COMPARATIVE EFFECTS OF VARIOUS BIOLOGICAL MEDIATORS ON ISOLATED PORTIONS OF THE GASTROINTESTINAL TRACT. (It.) Cugurra, F. (U. Trieste, Italy) and A. Vaccari. Minerva Pediat. 19(15):731-737, 1967.

The effects of several autonomic drugs on various portions of the gastrointestinal tract (gastric fundus, jejunum, ileum) were studied in 138 newborn Wistar albino rats and 33 newborn guinea pigs (S.M. strain), and results compared to those observed in adult rats (11-12 mo. old) and guinea pigs (4 mo. old). The following drugs were used: serotonin creatinine sulfate; histamine- 2 HCl; furfuryltrimethylammonium iodide; nicotine tartrate; L-norepinephrine HCl; (-)isopropylnorepinephrine ("Isoprenalin"); bradykinin ("BRS-640"); and angiotensin ("Hypertensin"). All drugs were dissolved in Tyrode soln. at room temperature immediately before use; ascorbic acid (10 µg/ml) was added to the L-norepinephrine and (-)isopropylnorepinephrine soln. and atropine sulfate (10^{-7} g/ml) to the bradykinin soln. before use. Cumulative dose-response curves were obtained according to the Van Rossum technic. No significant differences were observed in the response of newborn or adult animals to histamine or bradykinin as regards the guinea pig ileum, to nicotine as regards the guinea pig jejunum, or to furfuryltrimethylammonium iodide as regards the rat jejunum. The newborn guinea pig ileum was less sensitive to angiotensin. The newborn rat fundus showed a marked decrease in sensitivity

(-235 times) to serotonin as compared to adults; however, values returned to normal by day 29. The newborn rat fundus also showed a marked decrease in response to L-norepinephrine (-230 times) as compared to adults; however, receptor affinity (pD_2) gradually increased to max. values by day 6, then decreased and reached normal values by day 29. The newborn rat fundus showed a symmetrical but opposite affinity for L- and (-)isopropylnorepinephrine; a progressive increase in sensitivity was noted towards the former as compared to progressive decrease towards the latter. No increase in sensitivity on the part of the various gastrointestinal segments of the newborn animals studied was observed towards any of the agents.

9721 PATHOLOGY OF AMINO ACID EXCESS. VII. PHENYLALANINE AND TYROSINE. (E.)

Klavins, J. V. (Brooklyn-Cumberland Med. Ctr., N. Y.). Arch. Path. (Chicago) 84(3):238-250, 1967.

A 2-part study was performed on male Sprague-Dawley albino rats. In Part 1, animals were divided into 8 groups and fed a basal diet with or without supplements of DL-phenylalanine and DL-tyrosine, the excess amino acids being added in 0.25 or 0.50 molal amounts. In Part 2, animals were divided into 5 groups and fed a basal diet, with DL-phenylalanine and DL-tyrosine added in 1.25 molal amounts. Duration of the diet was 4 wk. In Part 1, no significant differences in the various experimental groups and controls were found for food consumption, animal wt., blood urea nitrogen, hemoglobin, hematocrit, WBC, reticulocyte count and differential count of WBC. However, when the amino acids were added in 1.25 molal quantities in Part 2, there was marked damage to the pancreas, slight liver damage, deposition of Fe in the liver, hyperkeratosis of the skin, inhibition of spermatogenesis at the spermatid level and inhibition of body wt. when the animals received excessive amounts of DL-phenylalanine; such changes were not observed with excess DL-tyrosine. When both phenylalanine and tyrosine were admin. simultaneously, there was increased mortality of animals, and in the surviving animals, the changes were similar to those seen with excess phenylalanine.

9722 IN VIVO DIALYSIS OF FAECES AS A METHOD OF STOOL ANALYSIS. II. THE INFLUENCE OF DIET. (E.)

Metcalfe-Gibson, A. (Roy. Postgrad. Med. Sch., London), T. S. Ing, J. J. Kuiper, P. Richards, E. E. Ward and O. M. Wrong. Clin. Sci. 33(1):89-100, 1967.

The technic of in vivo dialysis of feces was used to discover the source of ionic constituents which are present in the normal stool. Healthy adult subjects (6 men, 1 women; 26-40 yr. old) were studied while taking various electrolyte supplements p.o., or while on diets from which the possible precursors of fecal electrolytes were omitted. The latter regimen included an electrolyte-free diet, a methylcellulose diet
and a low protein diet. Conc. of Na, K and
in fecal dialysate were little influenced by
amount of these ions in the diet. The conc.
Mg and Ca in fecal dialysate were markedly i
creased by supplements containing these ions
fell to low values during an electrolyte-fre
The conc. of phosphate and sulfate were also
creased by dietary supplements; however, pho
conc. did not decrease and sulfate conc. wer
elevated during the electrolyte-free diet.
conc. of ammonium ion and total CO_2 and the
of fecal dialysate were uninfluenced by diet
supplements of ammonium chloride and sodium
carbonate. Total CO_2 content and pH were in
creased by dietary supplements of calcium ca
and magnesium chloride; ammonium ion, total
gen and osmolality were reduced in subjects
a diet low in protein. The organic anion in
dialysate was reduced to a fourth by a diet
sisting of pure methylcellulose only. It is
concluded that Na, K and Cl are of endogenou
origin, derived from alimentary secretions,
that Mg and Ca are normally derived from the
At least a portion, and possibly most, of th
phosphate and sulfate are of endogenous ori
Organic anion is chiefly derived from the d

9723 FUNCTIONAL AND MORPHOLOGICAL CHAN
OBSERVED UNDER COLLATERAL AND RED
BLOOD CIRCULATION IN STOMACH. (Rus.)

Bore
G. K. (Tomsk Med. Inst., USSR), A. P. Gurch
and L. I. Korochkin. Arkh. Anat. 52(1):51-
1967.

After ligation of vessels of the greater an
lesser curvature of the stomach in 20 matur
10 of which had a Basov fistula in the pylo
significant shifts in the periodic motor fu
of the stomach were phasic in character. P
gastric contractions were absent in most of
dogs, with both collateral and reduced bloo
circulation, 1.0-1.5 mo. after surgery; aft
1.5-2.0 mo., periodic gastric motor activit
restored, but the amplitude of single contr
was 1.5 times greater than the basic. A co
normalization was not found even after 12-1
In an acute experiment (3 dogs), ligation
of the large gastric arteries resulted in
crease in the pressure in the left gastro-e
artery; the first order waves markedly decr
while total blood pressure in the carotid
remained almost unchanged. Subsequent liga
of similar gastric veins resulted in an in
of blood pressure to the initial level in
gastro-epiploic artery, and the amplitude
pulse fluctuation markedly increased. In
experiments, exclusion of large gastric ve
caused their pronounced dilatation, the ar
became twisted, and anastomoses developed
site of the ligature; the surrounding vess
were formed from different sources. In co
tion with functional disturbances during l
of gastric vessels, morphological shifts i
intramural nervous system were found. All
an increase in the amount of changed nerve
in Auerbach's and Meissner's plexus; these

i a reactive (Kugel phenomenon; increased argyro-
ilia, hyperchromatosis, increase in amount of
ocesses) and pathological (vacuolization of
iroplasm, disintegration of neurofibrillar ap-
ratus, nuclear pyknosis, total chromatolysis)
iracter, and showed unique topography in dif-
rent dogs. RNA content in nucleoli and neuro-
asm was changed in all animals, while nerve cell
clei showed no changes in the DNA content.

:4 STOOL PATTERNS OF HEALTHY ADULT MALES.
(E.) Rendtorff, R. C. (U. Tennessee
1. Med., Memphis) and M. Kashgarian. Dis.
on Rectum 10(3):222-228, 1967.

otal of 8267 stools were collected from 115
e subjects (prison inmates) for 6 mo., and the
tistical variables of wt. and consistency of
ols, hr. of interval between stools, daily
quency and time of day of defecation were
lyzed. Ages of the subjects ranged between
and 57 yr.; 74 (64%) were 20-29 yr. old; 33
%) were 30-39 yr. old; 6 (5%) were 40-49 yr.
; and 2 (2%) were 50-59 yr. old. The av.
ber of stools was 72 per individual, ranging
m 33-189. The period of observation av. 73
s, ranging from 39-89. The av. wt. of stools
115 individuals was 123.6 g; the median was
.7 g. In all, 46% of the stools were of a
m consistency, 36% were semiformed, 15% were
t to mushy, and 3% were loose, watery or diar-
ic. The av. interval between stools was 27.6
, indicative of a 1-day cycle; av. less than
s (i.e., 1 stool every 2 days) were a common
urrence. The av. modal time of day of evacua-
n indicated that, generally, stools were post-
ndial; preprandial evacuation occurred in
e cases. Analysis of consistency in relation
wt. of stools confirmed the general assumption
t as the passage of the stool is delayed,
er is absorbed and stools become lighter and
ner. The subjects showed distinctive individual
terns during their period of observation. Ex-
es of variability within individuals and be-
en individuals were found.

EVOKED POTENTIALS IN POSTERIOR VENTRO-
LATERAL THALAMIC NUCLEUS IN RESPONSE TO
ULATION OF MESENTERIC NERVES AND GASTRO-
STINAL RECEPTORS. (Rus.) Musiashchikova,
. (Pavlov Inst. Physiol., Leningrad, USSR).
ol. Zh. SSSR Sechenov 53(5):496-505, 1967.

ats anesthetized by chloralose (70-80 mg/kg
) and immobilized by gallamine triethiodide
xedil), the provoked potentials were led from
ventral posterior lateral part of the thalamus
secondary somato-sensory region of the cortex
he right hemisphere, where the central ends
he mesenteric nerves and mechanoreceptors of
stomach and large intestine were stimulated.
he part of the nucleus, limited by coordinates
per and Ajmone-Marsan, 1955) frontally from
10.0, laterally from 5.5-8.5 and by vertically
+3.0 to +1.0 (above 0 horizontal) provoked
potentials appeared during the stimulation of nerves and receptors; most often the focus of max. activity was determined in the central part of the nucleus on frontal coordinates, 8.5-9.0, lateral, 7.0-7.5, and vertical, 2.5-1.0. Its location, however, varied and in some experiments was located on other coordinates. Simultaneous recording of responses in the thalamus and cortex during stimulation of mesenteric nerves showed that the potentials appearing in both regions are identical in form and time parameters. The latent period of thalamic response in the focus of max. activity during mesenteric nerve stimulation is 2-3 msec. shorter than the latency of cortical responses in the focus of max. activity in the second projection zone. The provoked potentials had a biphasic form and started with positive oscillation, which was replaced by a negative. Duration of the first phase was 23-30 msec. The form of responses of the ventral posterior lateral part of the thalamus, their time parameters and relation to rhythmical stimulation give reason to regard them as primary, and the region of the nucleus in which they appeared as the projection region of the mesenteric nerves. Stimulation of gastric and large intestine mechanoreceptors by balloon produced a series of provoked potentials. Each single potential in series could be identified by form and some time parameters with the primary response, which appeared on stimulation of mesenteric nerves. The potentials in the thalamus appeared simultaneously with provoked potentials of the cortex, in these cases, when both electrodes were in the foci of max. activity. The frequency of the series of potentials in the responses of the thalamus and cortex was 2-3 per sec.; this frequency was optimal for the responses of cortex and thalamus during electrical stimulation of the nerves. In experiments with stimulation of thalamus, responses in the cortex could appear also during frequent stimulation of the thalamus. On the basis of these it is concluded that the conversion of continuous afferent impulses, going from the receptors during stimulation of internal organs, into slow rhythmical activity of the cortex does not originate in the thalamus.

9726 CONTEMPORARY DEVELOPMENT IN THE BIOCHEMISTRY OF THE GASTROINTESTINAL HORMONES. (E.)(Rev.) Mutt, V. (Karolinska Inst., Stockholm) and J. E. Jorpes. Recent Progr. Hormone Res. 23:483-503, 1967.

9727 WATER OF THE CAVITY OF THE GASTROINTESTINAL TRACT AND WATER-SALT METABOLISM. (Uk.) Esipenko, B. E. (Bogomoletz Inst., Kiev, USSR). Fiziol. Zh. (Kiev) 13(4):460-463, 1967.

9728 ON THE MECHANISM OF ACTION OF ISOPROTERENOL IN STIMULATING DNA SYNTHESIS IN SALIVARY GLANDS OF RATS AND MICE. (E.) Malamud, D. (Temple U. Sch. Med., Philadelphia, Pa) and R. Baserga. Life Sci. 6(16):1765-1769, 1967.

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9732 THE INCORPORATION OF 1-^{14}C-D-GLUCOSAM INTO SUBCELLULAR FRACTIONS OF RAT INTESTINAL MUCOSA. (E.) Louisot, P. (Fac. Med., Lyon, France), J. Frot-Coutaz, G. Bertagnolio, R. Got and L. Colobert. Biochem. Biophys. Res. Commun. 28(3):385-389, 1967.

9733 ANALYSIS OF THE MECHANISM REGULATING ALIMENTARY BEHAVIOR EVOKED BY HYPOTHA MUS STIMULATION. (Rus.) Kozlovskaia, M. M. (Pavlov Ist Med. Inst., Leningrad, USSR). Fizi Zh. SSSR Sechenov 53(6):650-656, 1967.

9734 THE EFFECT OF TREATMENT WITH PILOCARI ON THE WEIGHT OF INNERVATED AND DENERVATED SUBMAXILLARY GLANDS OF RATS. (E.) Ohlin, P. Lund, Gleerup, 1966, 4 pp.

9735 FEEDING, DIGESTION AND ASSIMILATION IN ANIMALS. (E.) Jennings, J. B. Oxford, Pergamon Press, 1966, 288 pp., $3.00.

SILICONE-FOAM MOLDING OF THE CANINE
ILEOCOLONIC JUNCTIONAL ZONE. (E.)
, M. L., Jr. (U. Rochester Sch. Med., N. Y.),
Gordon, R. Terry and J. A. DeWeese. Amer.
. Dis. 12(8):813-822, 1967.

of the isolated ileocolonic junctional area
ade in 61 dogs (2 conscious, 6 anesthetized
immediately after death) by the forceful
nto the proximal colon of a mixture of ex-
g silicone-foam rubbers; the latter were
ng polysiloxane elastomers which, when
rized, changed from liquid to the solid state
oduced synthetic foam-rubber casts. An
constriction (mean width, 0.83 ± 0.067;
ength 0.40 cm ± 0.026) was consistently
trated on the molds at the junction of the
nd large intestine. A similar ring-like
ion (mean width, 1.14 cm ± 0.060; mean
0.31 cm ± 0.028) occurred at the point
ing of cecum and colon. The configuration
molds at both junctional zones indicated
sence of a narrow band of less distensible
ne at these sites. Dimensions of the ileum,
nd cecum were, resp., 1.62 ± 0.05 (range
3 cm), 2.47 ± 0.09 (range 0.8-3.8) and
0.04 (range 1.1-2.7 cm). Microscopic
tion of the tissue producing the indenta-
the ileocolonic junction showed that the
was composed of smooth muscle derived from
er circular muscle coat of the ileum and
coated by a transitional colonic type of epithelium. This intraluminal projection conformed to the morphological definition of a sphincter; the anatomical narrowing probably is at least partially responsible for a zone of elevated pressure interposed between the small and large intestine.

9737 SIGNIFICANCE OF LYMPHOID TISSUE IN THE DIGESTIVE MUCOSA. (Fr.) Crabbé, P. Brussels Editions Arscia S. A., 1967, 248 pp.

9738 ELECTRON MICROSCOPIC AND CYTOCHEMICAL STUDIES ON THE SO-CALLED ZYMOGEN GRANULES IN THE RAT SUBLINGUAL GLANDS. (Jap.) Fujita, K. (Osaka U. Dent. Sch., Japan). Nippon Soshikigaku Kiroku (Arch. Histol. Jap.) 28(2):165-183, 1967.

9739 ENTEROCHROMAFFIN CELLS IN THE EPITHELIUM OF THE DUODENUM OF THE SYRIAN HAMSTER (Cricetus auratus L.). (Pol.) Czerny, K. (Inst. Histol. Embryol., Acad. Med., Lublin, Poland). Folia Morph. (Warsz.) 25(3):457-462, 1966.

9740 DIFFERENTIATION OF FINE STRUCTURE OF THE LIVER CELL IN THE EARLY POSTNATAL PERIOD. (Ger.) Dvořák, M. (Purkyne U., Brno, Czechoslovakia) and K. Mazanec. Z. Zellforsch. 80(3):370-384, 1967.

See also abstract nos.: 10162,10617

9741 OUABAIN EFFECT ON TRANSMURAL TRANSPORT OF POTASSIUM BY CANINE SMALL INTESTINE.

(E.) Weiner, D. E. (U. Virginia Sch. Med., Charlottesville). Proc. Soc. Exp. Biol. Med. 125(2):648-651, 1967.

Isolated preparations of jejunal mucosa were obtained from fasted dogs, and incubated in a modified Krebs-Henseleit bicarbonate buffer containing 10 mM glucose, 140 mM Na ion and 12 mM K ion. ^{42}K was added to the incubation soln. to serve as a tracer for K movement. All jejunal membranes were mounted in pairs, and at the end of an equilibration period of 30 min., ouabain (10^{-5} M) was added to 1 of the pairs. In separate experiments, the flux of K into the cell interior was measured by labeling the incubation soln. facing 1 cell surface with ^{42}K and labeling the other soln. with ^{86}Rb. Ouabain affected K transport only when added to the serosal incubation soln.; addition to the luminal incubation soln. was without effect. Ouabain at a conc. of 10^{-6}M altered K transport, but the onset of peak activity occurred late, at 60-90 min. after addition of the agent. Ouabain markedly accelerated the K transmural influx (mucosal to serosal soln.) across the mucosal membrane, the difference between control and ouabain being statistically significant; the small decrease in transmural potential in the presence of ouabain was not statistically significant. K permeability of the mucosal and serosal cell surfaces in the presence and absence of ouabain showed that the latter did not affect the influx across the luminal cell surface, but did significantly decrease the influx across the serosal cell surface. These results suggest several conclusions concerning the transport of K by the small intestinal mucosal cell. It appears likely that K actually passes through the cell, rather than passing through extracellular channels between cells, as has commonly been suggested. This alteration in cellular K transport appears to be carrier-linked, and the carrier involved in the ouabain-enhanced transmural flux is on the serosal surface of the mucosal cell. Since K cannot be shown to be transported against an electrochemical gradient and K transport has a low Q_{10} suggestive of a diffusion process, the carrier process involved in K transport may be an example of an equilibrating carrier system. Whether K has a carrier mechanism regularly available, or whether it is able to use the Na carrier when the latter is altered by addition of ouabain to the system, is an important question which remains to be answered.

9742 ROLE OF INTRALUMINAL PRECIPITATION IN SECRETION OF SMALL INTESTINAL CALCIUM AND PHOSPHATE IN THE DOG.

(E.) Schedl, H. P. (U. Iowa Coll. Med., Iowa City), G. W. Osbaldiston and I. H. Mills. Nature (London) 215(5097): 198-199, 1967.

The hypothesis that Ca exists in more than 1
phase was examined, and the following parame
tested: 1) the Ca composition of endogenous
intestinal secretions, and 2) the Ca and pho
phate content in the lumen 30 min. after a
dilute Ca soln. had been introduced into clo
segments of small intestine. Two adjacent
jejunal and 2 adjacent ileal segments were p
pared in situ in each of 17 fasted, anesthet
dogs; each segment was approx. 20 cm long ar
contained 2 arcades of mesenteric vessels.
all were prepared, the 4 segments were flush
as quickly as possible with 200 ml of saline
followed by air. In 5 dogs, no soln. was in
duced, the empty segments were left in situ
1 hr. and the endogenous secretion was colle
by washing with 25 ml of 5% mannitol. In 12
dogs, 10 ml of a soln. containing 1 mg of Ca
(as $CaCl_2$) and 100 mg of inulin was immediat
introduced; after 30 min. the luminal conten
were collected and analyzed for Ca, inulin a
phosphate. All samples contained a small
porportion of precipitate. Inulin was virtu
unabsorbed during a 30-min. period. Endogen
Ca entered empty segments and was not homoge
Ca was present both in soln. in the superna
and in the form of an acid-soluble precipit
Thirty min. after the Ca soln. was introduc
intraluminal contents were also in 2 phases
Ca and phosphate were present in the precip
but the proportion of precipitated Ca was m
lower than in the empty segments. The acid
soluble precipitate was not identified, but
acidification, bubbles of gas were evolved,
suggesting that the precipitate was, at lea
part, a $CaCO_3$ or $Ca(HCO_3)_2$ complex.

9743 DUODENAL CALCIUM TRANSPORT IN HYP
THYROIDISM.

(E.) Krawitt, E. L.
Iowa Coll. Med., Iowa City). Proc. Soc. Ex
Biol. Med. 125(2):417-419, 1967.

The influence of hyperthyroidism on intesti
Ca absorption was studied with an in vivo
perfusion technic in the rat duodenum. Mal
Sprague-Dawley rats were made hyperthyroid
daily inj. with 125 µg of l-thyroxine for 1
days; during the 2 wk. prior to study, all
animals were fed laboratory chow containing
Ca. The duodenum was perfused with fluid f
reservoir containing 17 ml of soln. by re-
circulation at a rate of 1.8 ml/min. for 2
using a proportioning pump; the perfusing s
of pH 6.5 contained 1.7 mM $CaCl_2$, 141 mM Na
10 mM 1;1:1-tris (hydroxymethyl) methylamin
0.2% polyethylene glycol and 0.01 µc ml ^{45}C
Animals which received the daily inj. of l-
thyroxine suffered a loss of body wt. of ap
5%, as well as developing weakness, diarrhe
alopecia. The mean 2-hr. absorption rate o
was 11.5 ±2.8 µmol/g wet wt. of intestine f
hyperthyroid animals, compared with a mean
14.7±4.0 for controls. Mean lumen to plasm
flux in hyperthyroid rats was 14.6±4.0, whi

of controls 19.0±4.8. The plasma to lumen
means were 3.1±1.4, and 4.3±2.5 for hyper-
oid and control rats, resp. The last 2
, although slightly decreased, were not
stically significantly different in hyper-
oid rats compared to normal control animals.
findings do not support the hypothesis of
ased Ca absorption in the duodenum as a
factor contributory to the increased fecal
tion of Ca seen in hyperthyroid rats.

PASSAGE OF RADIO-IODINATED INSULIN THROUGH THE INTESTINAL WALL OF THE RAT.

D'Addabbo, A. (U. Bari, Italy), G. Fanfani
. Muscogiuri. Diabetologia (Berlin) 3(3):
10, 1967.

ulin was admin. i.v. to normal rats, and
assage of radioactivity into the duodenal
containing a protease inhibitor (Trasylol)
tudied by 2 technics. In the first, the
insulin was separated from the intestinal
nt by electrophoresis; in the second, the
activity that remained on an ion-exchange
, directly introduced into the small
tine, was measured. Within 15 min. after
a small amount of ^{131}I-insulin passed into
ntestinal lumen. The absorption of ^{131}I-
in from the small intestine into the blood
tudied after introduction of ^{131}I-insulin
with Trasylol into the intestinal loop.
adiography of the electrophoresis of serum
d plasma-protein-bound radioactivity, but
dioactivity due to unbound (free) ^{131}I-insulin.
findings reveal that the passage of insulin
gh the intestinal wall of rats can be
strated by neutralizing the proteolytic
ity in the intestinal tract. Insulin, like
other proteins, passes across the intestinal
and a 2-way movement of this molecule is
ble.

EFFECT OF INTESTINAL CONTENTS ON UPTAKE OF RADIOIRON BY EVERTED RAT GUT SACS.

Murray, J. (U. Minnesota, Minneapolis) and
ein. Proc. Soc. Exp. Biol. Med. 125(2):
3, 1967.

vitro uptake of ^{59}Fe (ferrous citrate) by
d gut sacs from fasted and nonfasted
e-Dawley rats was studied using several
of secretions; the first 20 cm of intestine
the pylorus was used to provide 4 seg-
of 4 cm from each rat. Segments were
exposed to the prepared secretion or test
al at 37°C for 30 min., then washed in
ld phosphate buffer at pH 7,2; the uptake
e by the segments as ferrous citrate was
etermined and recorded as an index of
. The following 11 parameters were stu-
1) sacs from unfasted rats; 2) sacs from
ted fasted rats; 3) sacs from fasted rats
ated with Laboratory Chow; 4) sacs from
rats pretreated with intestinal wash from
rats given pancreozymin, secretin and histamine; 5) sacs from fasted rats pretreated with intestinal wash from fasting rats; 6) sacs from fasted rats pretreated with boiled intestinal wash; 7) sacs from fasted rats pretreated with ascorbic acid; 8) sacs from fasted rats pretreated with stomach contents from unfasted rats; 9) sacs from fasted rats pretreated with stomach contents from fasted rats; 10) sacs from fasted rats pretreated with stomach contents from fasted rats given histamine; and 11) sacs from fasted rats pretreated with intestinal wash from unfasted rats. Intestinal contents from fasted animals had no significant effect on uptake of ^{59}Fe by intestinal sacs from fasted rats, but intestinal contents from unfasted animals increased the index considerably. Stomach contents from fasted rats or from rats stimulated with histamine also increased the indices, but not as greatly as unfasted intestinal contents. No other test soln. had a significant effect on the segments and boiling destroyed the ability of unfasted intestinal contents to potentiate Fe absorption. Sacs from unfasted rats without pretreatment with test soln. also showed considerable increase in uptake over segments from fasted rats. Several deductions can be made from these experiments. There is a factor in intestinal contents of feeding animals that facilitates the uptake of Fe by everted intestinal sacs, and there is a factor in neutralized gastric juice from fasted animals or animals stimulated with histamine which has a similar, but less powerful, effect. The gastric factor is not the same as the intestinal factor, since the latter appears only in the feeding animals and the former in fasting or stimulated animals. Pancreozymin, plus secretin, plus histamine stimulation of fasting animals does not potentiate Fe absorption, thereby suggesting that pancreatic secretions alone do not influence Fe absorption in sacs. The intestinal factor appears to be the result of the action of intestinal secretions on food and can be destroyed by heat. It is emphasized that these findings are strictly in vitro observations.

9746 TRANSPORT OF BASIC AMINO ACIDS BY HAMSTER INTESTINE.

(E.) McLeod, M. E. (Duke U. Med. Ctr., Durham, N. C.) and M. P. Tyor. Amer. J. Physiol. 213(1):163-168, 1967.

In sequential sections of small intestine derived from male golden hamsters, chromatographic analysis of serosal fluid from everted tissue sacs and extracts from tissue segments, following incubation with ^{14}C-labeled L-arginine, L-lysine and DL-ornithine, showed that transport against a chemical conc. gradient was demonstrable with respect to all 3 amino acids throughout the entire length of the small intestine. Following incubation with L-arginine, considerable radioactivity was found in urea cycle metabolites other than arginine, decreasing progressively in segments derived sequentially from the pylorus to the cecum. Considerably less metabolic transformation was evidenced with respect to DL-ornithine, while essentially all radioactivity was present as lysine after incubation with L-lysine, whose rate of transport was substantially identical throughout the entire length of the small intestine when only tissue segments were analyzed. However, the distal intestine was the site of max. transport for all 3 basic amino acids, when the tissue sac technic was employed.

9747 INTRINSIC FACTOR-MEDIATED ATTACHMENT OF VITAMIN B_{12} TO BRUSH BORDERS AND MICROVILLOUS MEMBRANES OF HAMSTER INTESTINE. (E.) Donaldson, R. M., Jr. (U. Wisconsin Med. Sch., Madison), I. L. Mackenzie and J. S. Trier. J. Clin. Invest. 46(7):1215-1228, 1967.

The uptake of ^{57}Co-labeled cyanocobalamin by the brush borders and microvillous membranes of the distal half of the hamster intestine was increased by hamster intrinsic factor preparations. A corresponding effect was observed using rabbit and rat intrinsic factor preparations. Preparations obtained from dog, hog and man were ineffective. Vitamin B_{12} uptake by the brush borders correlated well with the vitamin B_{12}-binding capacities of different fractions of intrinsic factor obtained by either gel diffusion or ion exchange chromatography. Vitamin B_{12} uptake mediated by intrinsic factor occurred rapidly, was unaffected by removal of glucose or O_2 and lowering of the incubation temperature. Pronounced reduction in uptake occurred with the absence of divalent cations. Preincubation of proximal brush borders with the supernatant obtained from the centrifugation of distal segment preparations resulted in an increased vitamin B_{12} uptake. Decreased uptake and lysis of brush borders resulted from prolonged incubation of brush borders with crude saline extracts of hamster gastric mucosa. Increased purity of intrinsic factor preparations resulted in higher uptakes of vitamin B_{12}. These findings give greater support for the presence of a specific receptor for intrinsic factor-bound vitamin B_{12} at the microvillous surface of the intestinal cell.

9748 SOME PHYSIOLOGIC PROPERTIES OF HETEROTOPIC INTESTINAL EPITHELIUM. ITS ROLE IN TRANSPORTING LIPID INTO THE GASTRIC MUCOSA. (E.) Rubin, W. (Cornell U. Med. Coll., New York, N. Y.), L. L. Ross, G. H. Jeffries and M. H. Sleisenger. Lab. Invest. 16(6):813-827, 1967.

Biopsies of normal gastric mucosa from 9 of 10 fasting subjects showed no significant mucosal lipid after oil red O staining; the tenth exhibited a few lipid droplets within surface mucous cells. By contrast, gastric biopsies from 4 of 5 patients with intestinal metaplasia exhibited significant amounts of lipid in the lamina propria adjacent to surface heterotopic intestinal cells, particularly along surface
villi; the lipid-free biopsy from the fifth
patient had only a few intestinal-type cell
the surface. On 3 separate occasions, 1 of
lipid preparations (micellar lipid, an eggn
and linseed oil) was infused into the stoma
of a patient with extensive heterotopic int
tinal epithelium. Biopsies obtained before
sequentially after each infusion were stain
for lipid and examined by light and electro
microscopy. Surface heterotopic intestinal
epithelial cells transported large amounts
micellar lipid and significant but smaller
amounts of linseed oil or eggnog lipid from
gastric lumen. The morphologic phenomena
exhibited by the heterotopic epithelium dur
lipid transport appeared identical to those
exhibited by normal jejunal epithelium. Si
cant amounts of lipid could not be detected
within surface cells of gastric type after
micellar lipid instillation, but occasional
lipid droplets were noted after linseed oil
eggnog. These findings indicate that heter
intestinal epithelium is similar to normal
jejunal epithelium in its physiologic prope
Its presence within the gastric mucosa prob
changes this primarily secretory tissue to
that is more absorptive in nature. This
physiologic transformation may play a signi
role in the pathogenesis of diseases with
intestinal heterotopia is associated.

9749 EFFECT OF STIMULATION OF DIFFEREN
BRAIN CORTEX REGIONS ON LIPID ABS
IN THE GASTROINTESTINAL TRACT. (Uk.)
Faitelberg, R. O. (Mechnikov State U., Ode
USSR) and L. P. Nikiforova. Fiziol. Zh.
13(3):332-337, 1967.

Changes of lipid absorption in the gastro-
intestinal tract could be provoked by the
stimulation of different regions of the do
cerebral cortex. During stimulation of th
twenty-first field of the temporal region
the cerebral cortex with a current of 0.5
lipid absorption was decreased during the
4 hr. of the experiment, while at stimulat
with a current of 1-2 volt, lipid absorpti
changed slightly. With stimulation of the
eighteenth field of the occipital region o
brain by a current of 0.5-1.0-2.0 volts,
absorption in the gastrointestinal tract
decreased for 6 hr. At stimulation of the
seventh field of sincipital region of cere
cortex, the lipid absorption was markedly
creased only under the action of a current
1-2 volt. At stimulation of the sixth fie
the frontal region of the cerebral cortex
a current of 0.5-1.0-2.0 volt, lipid absor
substantially decreased. Mechanical stimu
of the dura mater of the occipital region
accompanied by a marked increase of lipid
absorption during the first 4 hr.

9750 PROPERTIES AND METABOLISM OF 2-A
KANOATES. III: ABSORPTION OF M

HYL 2-METHYLPALMITATE. (E.) Saladin,
(U. Michigan Med. Sch., Ann Arbor) and
Napier, Jr. *J. Lipid. Res.* 8(4):342-349,

ery from rat and rabbit tissues of fed methyl-
d ethyl-2-^{14}C 2-methylpalmitate with un-
d specific activity demonstrated the exis-
of mechanisms for the absorption and deposi-
f both methyl and ehtyl esters of fayyt acids,
st for 2-methylpalmitate. In thoracic duct-
ated rats, approx. 9% of the fed compounds
covered from the lymph during the first
; the rate of recovery reached a max.
n 6 and 8 hr. In the rabbit, the fed,
red esters in plasma were transported
pally by means of the low density lipoprotein.
r, only trace amounts of the unaltered
were subsequently detected in the blood
ssue lipids after feeding, even during the
of max. absorption; moreover, in contrast
least 1 report in the literature, further
es for methyl or ethyl esters of other
acids revealed that such esters of short-
alcohols constitute no more than a trace
(0.004-1.03%) of the lipids extracted
wide variety of mammalian tissues. It is
le that even these trace amounts of esters
as artifacts of autolysis, assay or
tion.

A SIMPLE TECHNIC FOR STUDYING INTESTINAL
ABSORPTION IN THE NURSING INFANT.
PTION OF LACTOSE IN NORMAL AND DYSTROPHIC
TS. (It.) Giunta, A. (U. Milan, Italy)
Porta. *Minerva Pediat.* 19(17):866-869,

tinal absorption was studied in 6 normal
g infants (8-18 mo. old) and in 9 dystro-
ursing infants (10-16 mo. old) according
e following simplified technic: introduction
gh the nasal route of a duodenal catheter
bulb measures 7 mm in diameter just past
igament of Treitz (under fluoroscopic con-
and subsequent p.o. admin. of a test meal
sed of protein (casein and lactalbumin)
; 22.3 g; fat (olive oil) 18.7 g lactose;
; sucrose; 18.7 g; maltose 4 g polyethylene
; 295 g water. Samples of intestinal con-
were obtained at 0, 30, 60, 90, 120, 150,
80 min. after feeding, and their lactose
lycol contents determined according to the
tröm method. Blood glucose curves were also
mined at 30-min. intervals 0-2 hr. after
ng. No difference was observed in the
glucose curves and glycol content between
groups. Dystrophic infants, however,
led a progressive decrease in lactose
ption as compared to normal infants; this
bly represents an exhaustion on the part
e enzyme systems concerned with lactose
down and absorption. The consistency of
values in these infants excludes the
bility of a difference in intestinal transit
e test meal. Correlation coefficients were barely significant: normal = 0.722 and dystrophic infants = 0.436. The above method is considered suitable for the determination of intestinal disaccharide absorption, but a greater number of tests must be conducted in order to obtain an accurate picture.

9752 THE ABSORPTION OF MALTOSE AND LACTOSE IN MAN. (E.) McMichael, H. B. (St. Bartholomew's Hosp., London), J. Webb and A. M. Dawson. *Clin. Sci.* 33(1):135-145, 1967.

The technic of jejunal perfusion was used to study the absorption of maltose and lactose in 20 subjects (16 men, 4 women; 18-62 yr. old) who were being studied for abdominal pain or diarrhea, and all of whom had a structurally normal jejunum. Of these, 3 had peptic ulcer, 5 had previous gastric surgery, 2 had ulcerative colitis and 1 had pancreatic steatorrhea; of these 11, 1 had lactase, sucrase and palatinase deficiencies, and 2 had lactase deficiency. Among the 9 subjects with no demonstrable organic lesions, 6 had lactase deficiency. The kinetics of absorption and hydrolysis were calculated from observations using 4 different conc. (1.25, 2.5, 5.0 and 10.0 g/100 ml) of perfused sugars. Total hydrolysis of lactose was less than that of maltose, but it only became rate-limiting for absorption in subjects with constitutional hypolactasia. Max. hydrolysis of disaccharide was observed at low levels of mucosal disaccharidase, and it is suggested that hydrolysis may not only be limited by mucosal disaccharidase activity. Absorption rates of glucose and maltose from soln. rendered isotonic with NaCl were the same; this shows that intraluminal Na conc. does not alter the rate of sugar absorption under the conditions of these experiments.

9753 INTESTINAL ABSORPTION OF SUGARS IN SEMI-STARVED RATS. (E.) Esposito, G. (U. Kentucky Coll. Med., Lexington). *Proc. Soc. Exp. Biol. Med.* 125(2):452-454, 1967.

Male Sprague-Dawley rats were divided into 2 groups, and were fed either *ad libitum* or food at 8 g/day/rat (semistarved group). At the end of 15 days of special feeding, absorption studies were performed *in vivo* by perfusion of a loop of upper jejunum with 50 ml of isosmotic Na_2SO_4 soln. containing either glucose or 3-0-methylglucose. Both of the latter 2 agents were present in the perfusing fluid in 2 initial conc.: 50 mg% (approx. 3.1 mM or 2.6 mM, resp.) and 150 mM. At low lumenal conc., glucose disappeared significantly faster from the intestine of semistarved rats than from the controls (normally fed). Phlorhizin in low (10^{-4} M) conc. strongly inhibited glucose absorption from the intestine of both control and semistarved animals. However, absorption of the non-metabolizable sugar, 3-0-methylglucose was not influenced by previous semistarvation. When the sugar was offered in high (150 mM) conc., there was a slight increase in rate of absorption of both glucose and 3-0-methylglucose from the intestine of semistarved animals, but the statistical validity of this difference was highly questionable. It is suggested that semistarvation influences glucose absorption by modifying its intestinal metabolism, rather than by acting directly upon the transport mechanism.

9754 THE PORTAL TRANSFER OF GLUCOSE IN THE DOG. (E.) Varró, V. (U. Med. Sch., Szeged, Hungary) and L. Csernay. Amer. J. Dig. Dis. 12(8):775-784, 1967.

The quantitative conditions and dynamics of the portal transport of absorbed glucose were studied in the dog; a 10-15 cm long segment of proximal jejunum was isolated, and absorption and portal transport of isotonic glucose soln. introduced into the intestinal lumen was assessed; absorption was measured by the difference in the amount of sugar introduced and the amount retained, i.e., the amount of glucose (in mg) that disappeared from the lumen during a 15-min. experimental period. Considerable differences existed among individual animals as to rate of portal transport of glucose; this variation seemed to be determined by the metabolic conditions of the small intestine. In most of the animals, the amount of transported glucose ranged between 40-80%, but smaller and larger transport rates were also noted; in 18 animals, glucose transport was greater than 90%, even exceeding the amount of absorbed sugar. The amount of transported glucose was directly proportional to the arteriovenous glucose difference. A similar, but less direct, relationship was observed between corresponding values of glucose transport and intestinal blood flow. A considerable quantity of glucose was found to be transported during the first 3 min.; after glucose soln. was washed out of the intestine, little sugar transport was demonstrated, even during the first 5-min. period of study. In several animals the transport rate in a proximal jejunal segment was measured, as well as in a distal ileal loop. The same differences in transport values that occurred in study of portal transport were detected in both the jejunal segment and the ileal loop; no essential difference was observed between the percentage values of the jejunal and ileal transport.

9755 SMALL BOWEL GLUCOSE ABSORPTION IN RATS ON INHALING VARIOUS GAS MIXTURES. (Rus.) Amirov, N. Sh. (Inst. Normal & Path. Physiol., Moscow). Fiziol. Zh. SSSR Sechenov 53(6):705-710, 1967.

Glucose absorption from the small intestine with increased O_2 content in the gas mixture (up to 60%), at decreased content of O_2 (to 10%), normal O_2 content and increased CO_2 (from 5-35%) content was studied in male rats (180-200 g). Glucose absorption during the respiration of the
O_2 mixture was increased. With respiration c
the hypercapnic mixture of 5-35% CO_2 and 21%
the same increase of absorption was noted; at
5-10% CO_2, this increase was not reliable, wh
at 15-30% it was reliable. The increase of
absorption at 35% CO_2 conc. as well as the
decrease of absorption at respiration of low
mixture (10% O_2, 90% N_2) was not significant.
During respiration of a mixture containing 60
O_2 the blood O_2 level increased by about 10%
while during respiration of hypercapnic and l
O_2 mixture the latter was decreased. However
the decrease in glucose absorption during
respiration of the low O_2 mixture was not
significant, and during respiration of the
hypercapnic mixture the absorption increased.
Blood (portal vein) sugar level increase duri
respiration of the high O_2 mixture was relial
while the increase at 5% CO_2 and the decrease
10% CO_2 were not reliable. During respiratio
of the gas mixture containing 15-35% CO_2 or
during respiration of the low O_2 mixture the
blood sugar level decrease was reliable. Blo
(portal vein) lactic acid increase during glu
absorption was significantly lower in high O_2
and hypercapnic conditions and was unchanged
under low O_2 conditions when compared to controls. It is concluded that O_2 has an essent
role in intestinal absorption.

9756 INTESTINAL TRIGLYCERIDE ABSORPTION
THE RAT. AN ELECTRON MICROSCOPICAL
STUDY. (E.) Cardell, R. R., Jr. (Harvard U.
Cambridge, Mass.), S. Badenhausen and K. R.
Porter. J. Cell Biol. 34(1):123-155, 1967.

Fat absorption by the rat intestine was inves
tigated by 3 methods: Intubation of corn oil
into fasted animals; inj. of physiologic fatt
chyme prepared from fat-fed donor rats into
ligated segments of jejunum of fasted animals
by admin. of electron-opaque particles in cor
oil and markers given concurrently with the f
The results obtained do not support pinocytos
an important process in fat absorption and th
is doubt expressed as to whether pinocytosis
functions at all. It is suggested that fat i
absorbed by selective diffusion of monoglycer
and fatty acids from micelles rather than by
pinocytosis of unhydrolyzed triglycerides. D
pressions between the microvilli are not invo
in the transport of fat, as had been supposed
Rather, they appear to pass on their contents
lysosomes in the apical cytoplasm. Monoglyce
and fatty acids diffuse from the micelle at a
time when it is associated with the microvill
membrane of the absorptive cell. Micellar co
ponents penetrate the plasma membrane diffusi
into the cytoplasmic matrix where they contac
the smooth endoplasmic reticulum in which tri
glyceride synthesis occurs, resulting in the
deposition of fat droplets within its lumina.
Triglyceride synthesis and sequestration into
the smooth endoplasmic reticulum establishes
inward diffusion gradient of monoglycerides a
fatty acids.

DEMONSTRATION OF OXIDATION AND REDUCTION OF RETINAL IN RAT INTESTINE. (E.) ukh, D. S. (Indian Inst. Sci., Bangalore,) and J. Ganguly. Indian J. Biochem. 4(1): , 1967.

ABSORPTION OF CERTAIN B-GROUP VITAMINS IN THE COLON. (Rus.) Kuvaeva, I. B. . Nutr., Moscow). Fiziol. Zh.'SSSR Sechenov :835-839, 1967.

INHIBITION OF GASTROINTESTINAL ABSORPTION OF RADIOACTIVE STRONTIUM WITH SOME ION NGERS. (Jap.) Kubodera, A. (Sci. U. Tokyo), amatsu, T. Mori and S. Tsurufuji. Yakugaku i (J. Pharm. Soc. Jap.) 87(6):719-725, 1967.

ROLE OF THE PANCREAS IN DUODENOJEJUNAL ABSORPTION OF IRON. (Fr.) Plessier, J. Louis Hosp., Paris), Y. Najean and P. mopoulos. Rev. Medicochir. Mal. Foie 42(3): 28, 1967.

9761 WHOLE-BODY COUNTING OF THE ABSORPTION AND DISTRIBUTION OF IRON IN HAEMOCHROMATOSIS. (E.) Losowsky, M. S. (U. Leeds, England) and A. R. Wilson. Clin. Sci. 32(2):151-160, 1967.

9762 EFFECT OF CALCIUM AND PHOSPHATES ON GASTROINTESTINAL ABSORPTION OF STRONTIUM AND CALCIUM IN NEWBORN RATS. (E.) Kostial, K. (Inst. Med. Res., Zagreb, Yugoslavia), I. Šimonović and M. Pišonić. Nature (London) 215(5106):1181-1182, 1967.

9763 REGIONAL ABSORPTION. (E.) Ingelfinger, F. J. (Boston City Hosp., Mass.). Amer. J. Surg. 114(3):388-392, 1967.

9764 ABSORPTIVE CAPACITY OF THE SMALL INTESTINE. (Rus.) Skliarov, Ia. P. Kiev, Zdorov'ia, 1966, 197 pp., $1.00.

9765 INTESTINAL ABSORPTION OF CARBOHYDRATES, PROTEINS, FATS. (Rus.) Faitel'berg, R. O. Leningrad, Nauka, 1967, 147 pp., $1.00.

See also abstract nos.: 10271,10569

9766 PROGRESSIVE SYSTEMIC SCLEROSIS: I. GASTRIC SECRETORY PATTERN. STUDY UNDER BASAL CONDITIONS AND AFTER BETAZOLE HYDROCHLORIDE (HISTALOG) MAXIMAL STIMULATION.

(E.) Bettarello, A. (Med. Sch., Sao Paulo, Brazil), D. P. Neves and S. Zaterka. Amer. J. Dig. Dis. 12(8): 804-807, 1967.

Gastric secretory patterns were assessed in 24 patients (19 female, 5 male; 21-56 yr. old, with a mean age of 34.4 yr.) with progressive systemic sclerosis; 20 of them had an esophageal and/or gastroduodenal complaint (heartburn in 16, dysphagia in 13, regurgitation in 9, retrosternal pain in 3, epigastric pyrosis in 13, nausea and vomiting in 11, and epigastric pain in 8). Upper gastrointestinal X-ray examinations failed to disclose peptic ulcer in any patient; in 3, dilatation of the second and third portions of the duodenum was observed, and in a fourth patient, gastric ectasia was noted. Esophagitis was present in 13 of 22 patients in whom esophageal biopsy was performed; in 10 patients with esophagitis, a positive Bernstein test was observed. Gastric secretion was studied under basal conditions and after betazole stimulation. Controls were 20 healthy people (10 of each sex) with no digestive complaint. No staistically significant difference was observed in the gastric secretory pattern between both groups. Esophagitis in patients with progressive systemic sclerosis is not related to the degree of acid output by the stomach, and it is concluded that esophagitis is probably the result of regurgitation of gastric juice of normal or even low acidity to an already-weakened esophageal mucosa.

9767 INFLUENCE OF HISTAMINE ON PEPSIN SECRETION IN HUMANS.

(Uk.) Fisher, A. A. (Kuban Med. Inst., Krasnodar, USSR). Fiziol. Zh. (Kiev) 13(3):405-408, 1967.

Group 1 consisted of 15 healthy persons (12 males, 3 females; age 17-53 yr.), Group 2, 15 patients (13 males, 2 females) with gastric ulcer, and Group 3, 55 patients (50 males, 5 females) with duodenal ulcers. Histamine did not reduce pepsin conc. in the gastric juice; max. conc. was found in all persons in the first 30 min. after admin. of histamine (0.1 mg/10 kg body wt. of 0.1% soln., s.c.), and in the patients, as a rule, in the first 15 min. In Group 1, max. pepsin conc. exceeded the basal level by an av. of 2.75 times, in Group 2 by 1.75 times and in Group 3 by 1.34 times. At the end of 1 hr. after stimulation the pepsin content reached initial values in the patients and exceeded almost 1.5 times that in healthy persons. Av. pepsin (in mg/30 min.) or acid (in mEq per 30 min.) yield in basal secretion (15+30 min.) was 6.89 or 1.06 in Group 1, resp., 28.79 or 2.52 in Group 2, resp., in Group 3, 46.76 or 6.09, resp.; 45 and 60 min. after histamine stimulation it was in Group 1, 44.68 or 6.27, resp., in Group 2, 61.13 or 7.19, resp.,
in Group 3, 80.0 or 11.76, resp.; 75 and 90
after histamine stimulation was in Group 1,
31.46 or 5.23, resp., in Group 2, 37.08 or
resp., in Group 3, 51.09 or 9.70, resp.; an
yield ratio for $\frac{(45+60\ \text{min.})}{(15+30\ \text{min.})}$ was in Group 1
or 5.9, resp., in Group 2, 2.1 or 2.8, resp
Group 3, 1.7 or 1.9, resp.; for $\frac{(75+90\ \text{min.}}{(15+30\ \text{min.}}$
was in Group 1, 4.6 or 4.9, resp., in Group
1.3 or 2.1, resp., in Group 3, 1.1 or 1.6,
Therefore, in man, histamine provoked stimu
of peptic secretion to the same degree as a
at unchanged or increased gastric secretory
function; the degree of increase in pepsin
secretion was higher the lower its level be
stimulation.

9768 COMPARATIVE STUDY OF GASTRIC SECRE FOLLOWING THE ADMINISTRATION OF HISTAMINE, BETAZOLE HYDROCHLORIDE, AND A MI OF AMINO ACIDS.

(It.) Dal Monte, P. R. (U
Bologna, Italy), E. Fiore, L. Lodi and R.
Cremonini. Boll. Soc. Ital. Biol. Sper. 43
154-157, 1967.

The effects of histamine (0.02 mg/kg), beta
hydrochloride (1 mg/kg), and a mixture of a
acids (450 mg in 50 ml H_2O) on gastric secr
were investigated in 15 subjects without ga
intestinal disturbances. The above agents
admin. at intervals of 24 hr. from each oth
gastric juice samples were collected before
treatment and at 15-min. intervals over a p
of 1 hr. The vol., pH (Beckmann pH meter),
HCl content of the gastric juice were deter
for each sample. The av. vol. after 1 hr.
greatest following betazole (49 ml), slight
less following histamine (48 ml), and least
after amino acid mixture (23 ml). The high
level of gastric secretion was observed aft
min. (65 ml) with the amino acid mixture, a
30 min. (62 ml) with betazole, and after 1
with histamine. At the end of 1 hr., HCl c
was greatest after betazole (5.28 mEq), sli
less following histamine (4.8 mEq), and lea
after the amino acid mixture (1.3 mEq). Ma
HCl conc. was observed after 30 min. with b
(6.3 mEq) and amino acids (2.6 mEq), and af
1 hr. with histamine. The pH curves for hi
and betazole showed the same progressive de
from basal (3.4 and 2.7, resp.) to 1 hr. va
(1.2 in both cases); pH curves after amino
increased from a basal 3.0 to 3.2 after 15
then progressively decreased to 1.7 after 1
Comparison of results indicates that those
substances which are particularly active on
gastric mucosa (histamine and betazole) exe
stronger effect on gastric secretion than d
the amino acid mixture, which represents, h
ever, a physiological stimulus. Betazole i
better stimulating agent than histamine ina
as it is more potent, causes fewer side eff
and does not reqnire antihistamine protecti

769 EXPERIMENTAL STUDY CONCERNING THE
EFFECT OF ASSOCIATED RESERPINE AND
)LBUTAMIDE ON GASTRIC ACTIVITY. (Rum.)
hăilescu, M. (Institute of Medicine Pharmacol.
ab., Timisoara, Rumania). Fiziol. Norm. Pat.
2(5):443-448, 1966.

ngle or repeated (7-14 days) admin. of reser-
ine (0.0005-0.005 g/kg, i.p. or i.m. inj.) in
bino rats (200-250 g body wt.) increased av.
astric secretion to 2.1 ml within 7 hr. as com-
ared to 0.4-1.1 ml in controls. For tolbutamide
).1-0.5 g kg, p.o.) the av. gastric secretion
as 1.9 ml (5-7 hr.) while for associated admin.
f tolbutamide and reserpine the gastric secre-
ion amounted to 3.4 ml. Gastric acidity varied
arallel with the gastric secretion and was 37
Eq/liter for reserpine, 41 mEq/liter for tolbut-
mide and 49 mEq/liter for reserpine and tolbut-
mide; the gastric acidity in controls was
3 mEq/liter. Av. gastric-wall cholinesterase
ctivity following repeated admin. of tolbutamide
r reserpine was 55 U as compared to 43.5 U for
olbutamide and reserpine and to 70 U in controls.
astric ulcerations were noted in 58% of the
nimals receiving repeated treatment with reser-
ine while 27% of the rats receiving tolbutamide
nd 94.5% of those given reserpine and tolbutamide
ad stomach ulcerations. The number of ulcera-
ions was approx. 3 times greater (11-14) in
nimals treated with tolbutamide and reserpine
han in those given reserpine (3-5 ulcerations).
he functional and pathological changes suggest
hat extreme caution and continuous control must
e exerted in the prescription and admin. of the
gents studied.

770 THE ACTION OF RESERPINE ON GASTRIC
SECRETION. (E.) Schapiro, H. (U.
'ennessee Med. Units, Memphis). Arch. Surg.
(Chicago) 95(1):144-150, 1967.

he i.m. inj. of 0.5 mg of reserpine into human
ubjects (11 patients with duodenal ulcers, 3
ith gastric ulcers and 9 subjects with no gastro-
ntestinal complaints) caused, after a 30- to 45-
in. latent period, a gastric hypersecretion that
asted longer than 6 hr.; this reserpine-induced
gastric hypersecretion was not altered by bilateral
vagotomy, bilateral thoracolumbar sympathectomy, or
by gastric antrectomy. The i.v. inj. of 0.025-
).075 mg/kg of reserpine into dogs caused, after
a 30- to 45-min. latent period, a marked gastric
hypersecretion that lasted longer than 24 hr.; this
reserpine-induced gastric hypersecretion was not
max., for s.c. inj. of histamine at varying inter-
vals of time always caused a further increase in
gastric secrtion. Gastric hypersecretion caused by
reserpine in dogs could not be abolished by bila-
teral vagotomy, gastric antrectomy, bilateral
thoracolumbar sympathectomy, surgical resection of
the small intestine and colon, hypophysectomy,
or bilateral adrenalectomy. In studies with
antihistamines, 50 mg/kg of diphenhydramine did
not alter gastric hypersecretion induced by
reserpine. Very high conc. of anticholinergic
drugs could only reduce this gastric hypersecretion by 70-75% for 4 hr., after which time this gastric hypersecretion resumed; atropine (0.4-0.6 mg/kg) reduced the gastric response by 69%, hexamethionium (10 mg/kg) reduced it by 50%, and oxyphenonium (0.5-1.0 mg/kg) reduced the response by 75%. Neither sodium pentobarbital anesthesia nor spinal cord section at the C_1-C_2 level altered this gastric hypersecretion. However, this reserpine-induced gastric hypersecretion was abolished in 5 dogs in which the cerebral circulation was isolated from the rest of the body. It is postulated that reserpine releases a humoral agent from the central nervous system that acts to stimulate the stomach.

9771 STIMULATION OF GASTRIC-ACID SECRETION BY HISTAMINE, PENTAGASTRIN, AND PENTAGASTRIN-PROPANTHELINE AFTER VAGOTOMY IN MAN. (E.) Bank, S. (Groote Schuur Hosp., Cape Town, South Africa), I. N. Marks, J. H. Louw and N. Tigler-Wybrandi. Lancet 2(7506):67-69, 1967.

Of 18 patients who had undergone vagotomy-and-drainage procedures, 15 had duodenal ulceration, 1 had a prepyloric ulcer, 1 had pyloric obstruction of undetermined origin and in the remaining patient, no ulcer was found at operation. In 13 of the patients, the vagotomy was truncal and in 5 it was selective. Augmented histamine tests, pentagastrin (6 µg/kg, inj. s.c.) tests, and propantheline (30 mg, admin. i.m.)-pentagastrin tests were performed on the patients within 7-14 days of each other at least 3 mo. after vagotomy. The mean acid output after stimulation by pentagastrin was greater than the mean acid output after max. histamine stimulation. Propantheline, an anticholinergic agent, effectively reduced the acid response to the pentagastrin after complete vagotomy. Both the increased acid output after stimulation with pentagastrin and the reduction after propantheline were largely due to changes in the vol. of secretion. These results suggest that in man the gastric parietal cells after vagotomy respond more readily to gastrin-like stimulants than to histamine.

9772 DIFFERENCE IN RESPONSES BETWEEN DOGS AND CATS TO LARGE DOSES OF GASTRIN ON GASTRIC SECRETION. (E.) Emås, S. (VA Ctr., Los Angeles, Calif.) and M. I. Grossman. Gut 8(3):267-275, 1967.

The effect of a rapid i.v. inj. of a large dose of gastrin extract (3.2 or 6.4 g/kg body wt., chiefly the former) on gastric secretion induced by a background stimulation with histamine or gastrin was compared in conscious cats and dogs equipped with gastric fistulas. In dogs, rapid gastrin inj. markedly inhibited acid secretion induced by gastrin or histamine; after truncal vagotomy, this inhibition became even more pronounced. In cats, rapid inj. against background stimulation with histamine markedly increased acid secretion, presumably by a potentiating action of histamine and gastrin. Against background stimulation with gastrin the rapid inj. increased acid secretion to preinjection levels in cats; in cats, truncal vagotomy abolished the effect of the rapid inj. on acid secretion. In spite of the marked difference between these 2 species in the effect on acid secretion, rapid gastrin inj. against background stimulation with histamine increased pepsin secretion in both species; the increase in pepsin secretion was moderate in cats and marked in dogs, and the increase remained after truncal vagotomy. Against background stimulation with gastrin, the rapid gastrin inj. did not alter pepsin secretion in dogs, but moderately increased it in cats; the same results were obtained after truncal vagotomy.

9773 EFFECT OF TRUNCAL VAGOTOMY ON ACID AND PEPSIN RESPONSES TO HISTAMINE AND GASTRIN IN CATS. (E.) Emås, S. (VA Ctr., Los Angeles, Calif.) and M. I. Grossman. Amer. J. Physiol. 213(3):657-662, 1967.

Pepsin and acid responses to graded doses of histamine and hog gastrin extract were studied before and after truncal vagotomy in cats with gastric fistulas. Before vagotomy, gastrin and histamine produced the same max. rate of acid secretion. After vagotomy the max. rates with these 2 stimulants also were equal, but approx. 30% lower than before vagotomy. The latter procedure shifted the dose-response curves to the right. Before vagotomy the highest pepsin responses to histamine were produced by doses that gave submaximal acid responses; doses that produced max. rate of acid secretion depressed pepsin secretion. The same dose of gastrin was required for max. pepsin response as for max. acid response. Max. pepsin response to gastrin was higher than to histamine. Truncal vagotomy greatly reduced the max. pepsin response to both histamine and gastrin; after vagotomy, the pepsin responses to the entire range of doses of these 2 agents never exceeded basal output before vagotomy. The reduction of the max. acid and pepsin responses by vagotomy could not be overcome by increasing the dose of histamine or gastrin. It is concluded that truncal vagotomy reduces the responsiveness of the acid- and pepsin-secreting cells to both histamine and gastrin.

9774 THE EFFECT OF VAGOTOMY ON GASTRIC SECRETION ELICITED BY PENTAGASTRIN IN MAN. A MULTICENTRE STUDY. (E.) Gillespie, I. E., V. I. McCusker, G. Gillespie, I. D. A. Johnston, J. Spivey, R. H. Allsopp, R. A. Payne, A. G. Cox, M. Vedast, G. S. Makin, S. R. Srivastava, D. Johnston, K. Jepson and H. L. Duthie. Lancet 2(7515):534-536, 1967.

The effect of proven total gastric vagotomy on gastric-acid secretion in response to i.v. gastrin pentapeptide in 54 patients (all men) was a 62% reduction in the peak acid output when a dose-rate of 6 µg/kg/hr. of pentapeptide was used; with a dose-rate of 12 µg/kg/hr., the reduction was 51%. Reduction in the max. response, irrespective of dose, was 58%. Thes results are similar to those when max. doses o histamine are given as the stimulus to gastric secretion. With both dose-rates, mild side-effects of lightheadedness and slight nausea were experienced in several patients; with the 12 µg dose-rate, 3 patients became severely nauseated and had headaches, and the test was therefore terminated. The larger dose-rate of pentagastrin (12 µg/kg/hr.) elicited secretion of more acid than the smaller (6 µg/kg/hr.) after vagotomy, but it produced less acid when the vagi were intact. This suggests that afte vagal denervation the sensitivity of the parietal cell to gastrin pentapeptide is altered.

9775 USE OF PENTAGASTRIN IN A TEST OF GASTRIC ACID SECRETION. (E.) Johnsto D. (Roy. Infirm., Sheffield, England) and K. Jepson. Lancet 2(7516):585-588, 1967.

A gastrin test is described in which 6 µg/kg of pentagastrin is inj. i.m. and the gastric secretory response followed for 30 min. Dose response studies in healthy volunteers and patients (with duodenal or gastric ulcer, hiatu hernia, pernicious anemia and gastric carcinoma showed that this dose elicited max. levels of acid secretion. The peak response correspondec to the 20-min. period between 10 and 30 min. after the inj. Peak acid output was reproducible on repeated testing. Minor side-effects (slight nausea, lower extremity weakness, light headed sensation) were recorded in 7% of the subjects. This test appears to be of equal clinical value to any in use at present, and ha clear advantages in its brevity, simplicity and lack of side-effects.

9776 COMPARISON OF ENDOGENOUS AND EXOGENOUS GASTRIN IN STIMULATION OF ACID AND PEPSIN SECRETION. (E.) Cooke, A. R. (U. California Sch. Med., Los Angeles), D. L. Nahrwold, R. M. Preshaw and M. I. Grossman. Amer. J. Physiol. 213(2):432-436, 1967.

In dogs with a transplanted antral pouch, gastric fistula and Heidenhain pouch, a graded increase in acid and pepsin response occurred from the Heidenhain pouch and gastric fistula when acetylcholine, in conc. ranging from 15 µg/ml to 1000 µg/ml, was perfused through the antral pouch. Max. acid output occurred with conc. of acetylcholine at or above 1,000 µg/ml. The max. acid output from the gastric fistula was equal in response to endogenous gastrin and to exogenous hog gastrin; the max. acid output from the Heidenhain pouch was smaller in respons to endogenous gastrin than to exogenous hog gastrin. Max. pepsin output with endogenous or

enous gastrin stimulation was greater than
histamine. These results show that dose-
onse relations for acid and pepsin secretion
similar with endogenous gastrin and exogenous
gastrin in all principal features.

7 INHIBITION OF GASTRIC ACID SECRETION
BY A PURIFIED BACTERIAL LIPOPOLY-
HARIDE. (E.) Baume, P. E. (Roy. North
e Hosp., Sydney, Australia), A. Nicholls and
. Baxter. Nature (London) 215(5096):59-60,
.

rified lipopolysaccharide, prepared from the
ne-dependent mutant Escherichia coli ATCC
8, was inj. i.v. to Sprague-Dawley rats in
easing conc. (1-4,000 μg/kg), and the secre-
of gastric acid by these animals was meas-
by pylorus ligature. The purified E. coli
polysaccharide was a powerful inhibitor of
gastric acid secretion. Acid secretion was
st abolished by all doses greater than 50
g, while secretion was reduced to 50% of
trol values by a dose of 1.25 μg/kg. Larger
es (1000; 2000; and 4000 μg/kg) of the lipo-
saccharide were toxic. The reduced total
tric blood flow after inj. of lipopolysaccharide
associated with reduced gastric mucosal blood
, which was the cause of reduced secretion
acid. This effect on total gastric blood
appeared to be mediated by a separate sub-
nce produced in the body, probably in the
estine, since it could not be produced by
opolysaccharide inj. directly into the gastric
sels (previously reported). Lipopolysaccharide
ears to be 1 of the most potent of all
ibitors of acid secretion yet described.

8 GASTRIC SECRETION IN UNANESTHETIZED
CHICKENS. (E.) Long, J. F. (Albany
. Coll., N. Y.). Amer. J. Physiol. 212(6):
3-1307, 1967.

unanesthetized, fasting, cannulated White
horn chickens weighing 1-2 kg, basal gastric
retory vol. was measured at 15-min. intervals
to 6 hr., beginning after 30-45 min. gastric
inage to rid the crop and gizzard of residual
tent. The mean value obtained was 15.4 ml/hr.;
mean acid conc. was 93 mEq/liter; the mean
sin conc. was 247 PU/ml. Comparable tabula-
ns after s.c. admin. of histamine acid phos-
ate (4 mg/kg, single dose) were 38.8 ml/hr.,
5 mEq/liter and 210 PU/ml, resp. Admin. of
sulin (4 or 8 U/kg, i.v., single dose), reduced
stric acid conc. by 30-50% and by more than
%, resp., with a corresponding inhibition of
stric secretory vol. The degree of diminution
s directly dose-related, rather than related to
degree of hypoglycemia induced. There was
consistently significant pattern of change,
concerned pepsin secretion. Following atropine
mg/kg, i.v., single dose), the basal secre-
ry rate dropped to zero within 20 min., re-
ined there for 45 additional min., returned to
normal within 90 min. after inj. In chickens bearing both gastric and intestinal fistulas intraduodenal infusion of 6 ml triole n over a 15-min. period exerted no significant effect on either acid or pepsin secretion during a 2-hr. observation period following. It is concluded that the chicken secretes considerably more gastric acid and pepsin, both in the basal state and following histamine stimulation, than does man, the dog, the rat or the monkey, and may therefore be of value in experimental studies of gastric secretory inhibitors.

9779 INHIBITORY EFFECT OF FATS ON GASTRIC SECRETION. (Rus.) Gzgzian, D. M. (Sechenov Inst. Evolutionary Physiol. & Biochem., Leningrad, USSR) and M. G. Zaks. Fiziol. Zh. SSSR Sechenov 53(6):711-716, 1967.

The amount of gastric juice in the first hr. of stimulation with meat, or fat (oil) + meat, or alcohol (8%; 15 min. before meat) + fat + meat was, in the dog with Pavlov's stomach (1), 38.7, or 11.8, or 30.9 ml, resp. In the dog with Pavlov stomach and partial gastric sympathectomy (removal of both abdominal sympathetic chains) (2) it was 2.1, or 4.9, or 4.7 ml, resp.; and in the dog with Heidenhain stomach, partial gastric sympathectomy and resection of all visible nerves of the gastric vascular branch (3) gave 8.0, or 1.2, or 17.4, resp. Three-hr. experimentation in dog 1 showed that with stimulation by meat or alcohol + fat + meat the highest secretion was found in the first hr., while with stimulation with fat + meat the max. secretion occurred in the second hr. Av. acidity, studied in Dog 3, in first hr. of the experiment was with stimulation with meat 0.41/0.47, with fat + meat 0.23/0.36, with alcohol + fat + meat 0.50/0.54; digesting power of the juice showed no essential differences. Antidiuretic effect of fat (sunflower or butter) was studied in 2 dogs with exposed ureters by Pavlov-Tsltovich and gastric fistula by Basov. Av. diuresis before fat admin. of 3.2 ml/min. decreases after admin. of fat to 0.52 ml/min. (or by 83%). Antidiuretic reaction started 13 min. after and reached its max. 72 min. after admin. of fat; such reaction lasts about same time as the inhibitory effect of the same dose of fat on gastric secretion on meat. Antidiuretic action of fat is specific. Antidiuretic effect of fat, which was given after alcohol, was significantly lower than at pure fat antidiuresis; when alcohol was given on already developed fatty antidiuresis, a fast inhibition of antidiuretic reaction was noted and diuresis increased above the initial level. Therefore, the inhibition of gastric juice secretion by fat was completely eliminated by preliminary admin. of alcohol; marked antidiuretic effect, induced by fat feeding on the basis of water diuresis, is also eliminated by admin. of alcohol. Based on the data obtained it is suggested that hormones of the posterior lobe of the pituitary participate in the mechanism of inhibition of gastric secretion.

9780 INTRAGASTRIC PRESSURE AS A FACTOR INFLUENCING REDISTRIBUTION OF PEPSINOGEN AND CHLORIDES SECRETED IN THE GASTRIC JUICE AND URINE.

(Rus.) Korot'ko, G. F. (Kalinin State Med. Inst., Andizhan, USSR) and A. M. Musaev. Biull. Eksp. Biol. Med. 63(5):17-22, 1967.

Seven dogs with isolated stomachs of large vol. (by Pavlov, Savich, and Ugolev methods) and exposed ureter (by Pavlov) were studied. Increase of intragastric pressure up to 10-15 mm Hg resulted in a decrease of pepsinogen excretion in the secretion composition/time U, which became more pronounced with time and occurred due to a decrease in secretion and pepsinogen content in the juice. In some experiments only in the first hr. of increased intragastric pressure was there secretion with a low free acid content. With a decrease in proenzyme secretion in the juice, regular increases in uropepsinogen excretion occurred; this process increased urinary pepsinogen content. At a pressure of 30 mm pepsinogen exosecretion markedly increased up to 3-4 hr. and toward 6-8 hr. decreased and reached lower values than that obtained at atmospheric pressure in the gastric cavity. The increase of exosecretion is due to an increase of proenzyme content in secretion and to an increase of secretion vol. The pepsinogen exosecretion increase was accompanied by a decrease of uropepsinogen in consequence to a decrease in diuresis and proenzyme content in the urine. A pressure of 20 mm increases pepsinogen exosecretion to a lesser degree than a pressure of 30 mm. A pressure of 40 mm always depresses excretion of pepsinogen in the gastric juice. A reverse correlation was found between exosecretion and increase of pepsinogen depending on the degree of intragastric pressure. Negative pressure (20-40 mm) increased the conc. and excretion of chlorides in the juice but had no effect on the synthesis of acid. Increase of chloride excretion in the juice was accompanied by a decrease of their renal excretion. A depression of chloride excretion using the exosecretory route (at positive pressure, 10-15 mm) caused an increase of their excretion in the urine.

9781 CLINICAL STUDY OF THE SUPPOSED "SPARING EFFECT" ON HYDROCHLORIC ACID SECRETION ATTRIBUTED TO ACIDIFIED MILK.

(It.) Cantele, M. P. (Carlo Erba Ther. Res. Inst., Milan, Italy) and F. Brughera. Gazz. Sanit. 38(1-2):37-41, 1967.

The effects of various types of milk on gastric acid secretion were studied in 10 normal infants (2-4 wk. old). Group 1 (5 infants) were fed Milk No. 1 (powdered 50% cream cow's milk containing 20% protein, 11.5% lipids, 62.5% sugar, and 4% mineral salts) on day 1 and Milk No. 2 (same as above plus 3.22% lactic acid; pH approx. 4.8) on day 2. Group 2 (5 infants) were fed Milk No. 1 on day 1, Milk No. 2 on day 2, and human milk on day 3. Infants were fasted for 7-8 hr. before receiving 100 ml of each type of milk. Thirty min. after feeding, a gastric tube was inserted and 2-ml samples of gastric juice were obtained at 30, 60, 120, and 180 mi
Determination of pH and titration of Cl conten
were performed for each sample. No difference
was observed in gastric Cl values after feedin
with Milk No. 1 or Milk No. 2 in each group,
while gastric Cl values were perceptibly inferi
in infants fed human milk. No conclusions can
be drawn from these findings since the Cl content of human milk was lower than that of cow's
milk (32 mg/100 ml and 105 mg/100 ml, resp.),
and it is not possible to determine if the lowe
gastric Cl values were due to a "sparing effect
or to lower Cl content of the milk itself. The
av. pH gradient of the gastric juice was higher
(0.70-0.84 pH U) in infants fed Milk No. 1 tha
in those fed Milk No. 2 (0.3 pH U), but was highest (1.4 pH U) in infants fed human milk. Contrary to what has been hitherto believed, i
seems doubtful from the present findings that acidified cow's milk has a "sparing effect" on gastric acid secretion.

9782 VARIOUS ASPECTS OF GASTRIC SECRETION IN RATS TREATED BY THE SHAY METHOD.

(It.) Vecchioni, R. (U. Padua, Italy), G. Perr
and C. Cordiano. Acta Chir. Ital. 22(6): 693-703, 1966.

Various parameters of gastric secretion (as wel
as blood glucose levels) were investigated in male albino rats (Italicus strain; av. wt. 300
subjected to pyloric ligation according to the Shay method with or without subsequent i.v. inj
of 0.5 U/kg of insulin. Animals were sacrifice
15, 30, 45, 60, 90, 120, 150, 180, and 240 min. after surgery, and gastric juice (after centrifugation at 1500 rpm for 15 min.) and blood wer
collected for the necessary tests. The vol. of gastric secretion showed a gradual increase ove
the 4-hr. period in untreated rats, while insulin-treated rats showed a significant incre
within the first 2 hr. Total acid content of the gastric juice (determined by the Introzzi method) rose within the first 2 hr. from 50 to 99 mEq/liter and then decreased moderately between hr. 2 and 4; insulin increased the tota
acid content markedly (approx. 120 mEq/liter within the first hr.). The pH of gastric juice (electrometric method) decreased from 2.1 at 15 min. to 1.5 at 4 hr. in untreated animals; insulin produced a more marked drop (1 U within the first hr.). No significant differences wer
observed between the 2 groups with regard to electrolyte content of the gastric juice, as determined by flame photometry. Pepsin conc. (Mett method) was highest (above 160 Mett U) within the first hr. and stabilized at 150 Mett U between hr. 3-4; pepsin levels in insulin-treated rats reached 190 Mett U within the firs
45 min. Mucin (glucuronic acid) conc. (Siplet method) dropped from 14 mg/100 ml at 15 min. to 6.2 mg/100 ml at 2 hr. and increased again between 2 and 4 hr.; results were the same in insulin-treated rats.

VARIOUS "EARLY" RESULTS OF BILATERAL TRUNCAL VAGOTOMY. (EXPERIMENTAL STUDY).

Vecchioni, R. (U. Padua, Italy), C.
ano and G. Perrino. Acta Chir. Ital. 22(6):
10, 1966.

albino rats (Italicus strain; av. wt. 300 g)
subjected to bilateral truncal vagotomy
ved by pyloric ligation immediately after-
, 12 hr., 48 hr., 6, 8, or 15 days after
omy. Animals were sacrificed 5 hr. after
ion, and gastric juice and blood were
cted for the determination of various para-
s. Controls were subjected to pyloric
ion alone (Group 1) or to gastric fistula
ion (Group 2). A 5% mortality occurred
vagotomized rats and substitution was made
new animals. The vol., pH, total acid con-
and pepsin conc. of the gastric juice was
er in controls of Group 1 than in those of
2; electrolyte and mucin levels of the
c juice, as well as blood parameters, were
ar in both control groups. Vagotomy and
c ligation decreased the vol. and total
content of the gastric juice but increased
ues as compared to Group 1 controls. No
ences were observed with regard to gastric
or blood electrolyte levels. Gastric juice
nd pepsin conc. decreased progressively as
terval between vagotomy and pyloric liga-
ncreased; pH and total acid values showed
nhibition at 6- and 8-day intervals.
content was lowest in animals with a 6-day
al and close to normal in animals with a
interval. Total blood proteins showed a
decrease in animals with a 6-, 8-, or 15-
terval between vagotomy and pyloric
on. Other blood parameters (nonprotein
en, glucose, hematocrit, electrolytes)
no differences among the various groups.

POSSIBILITY AND RESULTS OF SELECTIVE GASTRIC VAGOTOMY IN THE RAT. (It.)

oni, R. (U. Padua), O. Fontanin, C. Cordiano
Perrino. Acta Chir. Ital. 22(6):729-735,

ive gastric vagotomy was performed in male
rats (Italicus strain; av. wt. 300 g) and
ed by pyloric ligation 6 days later.
c juice was collected and various para-
determined. Controls were subjected to
laparotomy to expose the stomach (Group 1)
bilateral truncal vagotomy (Group 2). To
all the animals subjected to selective
c vagotomy survived and no invalidating
were observed as of 5 mo. following
y. Results were similar to those observed
s of control Group 2. The vol., total
ontent, pH, and pepsin conc. of the gastric
of animals subjected to selective gastric
my was 1.12 ml/100 g, 36 mEq/liter, 3.84,
Mett U, resp.; similar values in Group 2
ls were 1.08 ml/100 g, 38 mEq/liter, 3.92,
Mett U, resp. Results indicate that this
vely simple method gives results comparable
in every way to those observed in rats treated by bilateral truncal vagotomy. The operation is well tolerated, and if the surgeon's movements are careful, asepsis maintained, and proper alimentation admin. in the postoperative period, there will be no deaths.

9785 QUALITATIVE COMPOSITION OF GASTRIC JUICE AND TEMPERATURE OF GASTRIC MUCOUS MEMBRANE.

(Uk.) Zagorodneva, A. G. (Inst. Physiol., Acad. Med., Kiev, USSR). Fiziol. Zh. (Kiev) 13(1):114-118, 1967.

Dogs with gastric fistulas (3) and stimulation of gastric secretion by histamine (0.4 ml of 0.1% soln., s.c.) comprised Group 1, dogs with isolated denervated and innervated pyloric part of stomach with fistula and anastomoses between stomach and duodenum (3) and gastric stimulation by peptone (5% soln. into pylorus) comprised Group 2, and dogs with additional admin. of 0.25% soln. of HCl into the pylorus made up Group 3. Study of these showed that isolation of large quantities of gastric juice with high acidity is accompanied by an increase in the temperature of the mucous membrane. With a decrease in juice acidity and a secretion intensity, a decrease occurred in the temperature of the mucous membrane. At the time of isolation of juice with high protein conc., mucous membrane temperature decreased, while with increased temperature of gastric mucous membrane, juice with low conc. of proteins occurred. At decreased or increased temperature, total acidity (in %) was: In Group 1 - 0.36 or 0.49, resp., in Group 2 - 0.35 or 0.45, resp., and in Group 3 - 0.17 or 0.45, resp. Total protein amount (mg) was: In Group 1 - 18.0 or 12.7, resp., in Group 2 - 11.8 or 10.4, resp., and in Group 3 - 11.2 or 6.1, resp.; Juice vol. (ml) was: In Group 1 - 10.3 or 8.8, resp., in Group 2 - 6.0 or 8.7, resp., and in Group 3 - 3.4 or 15.4, resp. A positive relationship exists between the changes in the temperature of gastric mucous membrane and qualitative composition of isolated gastric juice.

9786 A COMPLEX STUDY OF THE EFFECT OF LASTING NOCICEPTIVE (PAINFUL) STIMULATION ON THE SECRETORY AND EVACUATORY GASTRIC FUNCTION.

(Rus.) Grechishkina, A. P. (Lugansk Med. Inst., USSR) and V. Iu. Zhabenko. Fiziol. Zh. SSSR Sechenov 53(6):699-704, 1967.

Study was made on 10 dogs with Pavlov pouch (4) or Pavlov's pouch with fistula of the fundal part in which gastric secretion was stimulated by ground meat mixed with $BaSO_4$ and H_2O. Chronic nociceptive stimulation was provoked by stimulation of the posterior radicles of the lumbar section of the spinal cord by ligature with sharp beads, after laminectomy (Kravtsov's method); or by prolonged (2 or 5 hr.) periodically measured nociceptive stimulation of the sciatic nerve by electric current. In dogs treated by

Kravtsov's method, 2 wk. later there was a decrease of total amount of gastric juice, mostly because of reduced secretion during the first hr. as compared to controls; simultaneously the time of evacuation of the gastric content was increased. The changes of secretory and evacuatory gastric function were observed during 3-4 wk., which thereafter, was restored to the initial level. In a dog with laminectomy alone both functions were only slightly changed, e.g., the former was reduced, the latter delayed, for 1 wk. after surgery. Under the action of prolonged nociceptive stimulation the changes in gastric secretion had a biphasic character, e.g., an inhibition of gastric secretion during stimulation, and an increase of gastric secretion after discontinuation of stimulation. At the same time a marked suppression of evacuation of the gastric content was found.

9787 HYPOTHALAMIC STIMULATION AND GASTRIC SECRETION IN THE DOG.

(E.) Mason, G. R. (Stanford U. Sch. Med., Palo Alto, Calif.) and T. S. Nelsen. Amer. J. Physiol. 213(1): 21-24, 1967.

Hypothalamic stimulation has been associated with variable results when gastric secretion was the observed response; this variation has been due to inadvertent lesion creation from unbalanced wave-forms, incomplete sampling of secretion parameters, and limited stimulus control. Monopolar electrodes were implanted in the hypothalamus of each of 19 dogs (13 mongrels, 6 beagles); 6 dogs were used to prepare isolated innervated (Pavlov) gastric pouches. Electric hypothalamic stimulation of unanesthetized dogs was done for periods of up to 6 hr. In general, a current of less than 1 milliampere was used for stimulation; the stimulus was a continuous train of biphasic square waves, balanced for net current flow of 0, at frequencies of 10 and 100 cycles/sec. There was a consistent increase in both vol. and conc. of gastric acid from innervated gastric pouches after anterior hypothalamic stimulation at 10 cycles/sec.; the vol. and free acid rose together 15-30 min. after onset of stimulation. The secretion was relatively mucus-free, reaching conc. of 130 mEq/liter HCl. The insulin-hypoglycemic vagal stimulation of gastric secretion was used as a standard of comparison for electric hypothalamic stimulation. The responses were similar in time of onset and simultaneous rise of vol. and free acid conc. Hypoglycemia did not occur after electric stimulation alone.

9788 GASTRIC SECRETORY RESPONSE TO AMYGDALOID OR HYPOTHALAMIC STIMULATION IN MONKEYS.

(E.) Smith, G. P. (U. Pennsylvania Sch. Med., Philadelphia) and P. R. McHugh. Amer. J. Physiol. 213(3):640-644, 1967.

Electrical stimulation of the amygdala or hypothalamus produced defense reactions, marked increases of plasma 17-hydroxycorticosteroids
and significant inhibition of gastric acid
outputs in conscious macaque (*Macaca mulatta*)
monkeys equipped with gastric fistulas. Pepsi
outputs decreased less during brain stimulatic
In the 4 hr. after central stimulation, gastri
acid output did not increase significantly
above prestimulation values in spite of increa
plasma 17-hydroxycorticosteroids. These findings are evidence for including increases of
plasma 17-hydroxycorticosteroids and decrease
of gastric acid output as visceral components
of the defense reaction in conscious macaque
monkeys. Under the conditions of these
experiments, there was no evidence for an
adrenal phase of gastric acid stimulation.

9789 KINETICS OF GASTRIC JUICE SECRETION: A CORRELATION OF ARTERIOVENOUS DIFFE ENCES WITH THE COMPOSITION OF THE GASTRIC JUI

(E.) McQuarrie, D. G. (Minneapolis VA Hosp.,
Minn.), A. Eichenholz, A. S. Blumentals and
J. A. Vennes. Surgery 62(3):475-486, 1967.

Blood gas and electrolyte changes were simultaneously measured before and after a max.
betazole (150 mg, admin. i.v.) secretory
stimulus in the intact dog stomach; these cha
were related to the vol. and composition of t
gastric juice evolved. At baseline, the mean
gastric juice vol. was scanty (11.2 ml/hr.) a
had a low H ion conc.; in response to betazol
stimulation, there was a 9-fold increase in
gastric juice vol. with 4-5 times increase in
ion conc. In the unstimulated stomach, the
gastric venous blood showed O_2 consumption, a
rise in pCO_2 and a lower pH, when compared to
arterial blood; with vigorous gastric secreti
there was a marked change with an increased O
consumption, a venous pCO_2 below that of the
arterial pCO_2 and a rise in the venous pH. A
marked increase of bicarbonate conc. in gastr
venous blood was indicative of net extraction
H ion from blood perfusing the stomach. In
conjunction with the 9-fold increase in gastr
juice vol. in response to betazole, there was
increase in the gastric venous osmolality;
gastric juice osmolality was not significantl
below that of arterial blood. With stimulati
of gastric secretion there was a net extracti
of Cl across the vascular bed; the venous-arterial difference of Na and K was increased
and electrical neutrality was preserved by th
concomitant rise in bicarbonate conc. There
no significant relative change in blood flow
the left gastric artery in response to betazo
In the stimulated dog stomach the amount of f
CO_2 removed from plasma and the CO_2 produced
endogenous gastric metabolism did not quantit
tively account for the increased bicarbonate
conc. in the gastric venous blood when correc
for hemoglobin desaturation and lactate-pyruv
production; the most reasonable source of
additional CO_2 in the intact animal was bicar
containing secretions which reacted with H io
in a dilution-secretion, liberating freely

sible CO_2. Data of gastric blood flow
ed from osmolality in conjunction with the
ive change in the left gastric blood flow
sted that the response to betazole pro-
some redistribution of flow within the dog
ch.

TRANSMURAL POTENTIAL AND STIMULATED
ACID IN INNERVATED RAT STOMACH PER-
AT pH 3.0. (E.) Vaughan, B. E. (US Naval
. Defense Lab., San Francisco, Calif.),
Ridley and J. T. Cummins. Amer. J. Physiol.
:651-656, 1967.

as secreted at high rates, reaching 5-13
/min., promptly after s.c. inj. of 400 µg
emipurified gastrin preparation using
nesthetized with pentobarbital and pre-
for a recirculation perfusion of the
c lumen. The influent catheter entered
h longitudinal incision of the esophageal
and the effluent catheter through the
s. Only the inner epithelial tube of the
gus was ligated to the entry catheter.
ation of the "pH-stat" principle showed
timulated acid secretion was sharply cut
en the perfusion medium was changed rapidly
H 2.5 to pH 2.1. Sectioning of the vagal
and their associated fibers in the fore-
h area caused an immediate inhibition of
ated acid secretion; this could not be
ed by gastrin re-inj. Potential differ-
usually decreased from 41 to 36 millivolts
n resting and stimulated acid rates, but
as not an invariable finding. Short-
t current and conductance doubled under
conditions. Atropine, at doses sufficient
ck all receptor sites for inhibition of
c potential, had no effect on the stimula-
f acid secretion by re-inj. of gastrin.

EFFECT OF PROXIMAL DUODENAL ACIDIFICA-
TION UPON GASTRIC SECRETION IN THE
AT. (E.) Lee, Y. H. (UCLA Sch. Med., Los
s, Calif.) and J. H. Thompson. Amer. J.
is. 12(8):795-803, 1967.

fects of proximal duodenal acidification
asal unstimulated (spontaneous), max.
ine-stimulated and max. insulin-stimulated
c-acid- and electrolyte secretion in the
ylorus-ligated male Sprague-Dawley rat
0 g) were studied. Rats were given s.c.
saline (2.0 ml/kg), histamine phosphate
kg) or crystalline Zn insulin (40 U/kg),
e then divided into 9 groups: 3 received
usion, 3 were perfused with 0.9% normal
and 3 were perfused with 0.05 N HCl. The
on unstimulated basal gastric secretion
that gastric juice vol. in the saline-
d group (3.1±0.3 ml/2 hr.) was slightly
than the vol. collected from rats in the
group (2.5±0.2 ml/2 hr.); the low gas-
cretory vol. produced in rats perfused
05 N HCl (1.6±0.1 mg/2 hr.) was
statistically different from control and normal saline-perfused rats. Similarly, with gastric juice vol./100 g rat body wt., total acidity and acid output, comparable values were found in control rats (nonperfused) and in saline-perfused animals, with no significant difference between them; significantly lower values in all of these parameters were found in the acid-perfused animals. Values for Na ion in the control (nonperfused group), normal saline-perfused and acid-perfused groups were, resp., 71±4, 66±4 and 92±6 mEq/liter; for K ion, these values were 13.5±1.1, 15.6±0.7 and 6.7±0.7 mEq/liter, resp., and for Cl ion they were 105.5±3.5, 109.3±2.8 and 87.4±3.9 mEq/liter, resp. The differences between acid-perfused rats and the values for the other 2 groups were statistically significant. Duodenal acidification was without effect on any parameters of gastric secretion stimulated by a max. dose of crystalline Zn insulin or histamine phosphate.

9792 CAPILLARY PERMEABILITY AND TISSUE EXCHANGE OF WATER AND ELECTROLYTES IN THE STOMACH. (E.) Alvarez, O. A. (U. Chile, Santiago) and D. L. Yudilevich. Amer. J. Physiol. 213(2):315-322, 1967.

First-passage tracer dilution curves of siderophilin-^{59}Fe (intravascular reference), tritiated water, ^{22}Na, ^{36}Rb and ^{36}Cl were obtained after an intra-arterial inj. in an *in situ* chambered gastric wall preparation in the dog. Tracer fractional extraction and interstitium-blood turnover rates were computed. The data were interpreted in relation with the presence of 2 nutritional capillary beds in the gastric wall: smooth muscle and mucosa. Extractions in smooth muscle for Na, Cl, Rb and tritiated water av. 0.56, 0.72, 0.74 and 0.85, resp.; in mucosa, they av. 0.82, 0.86, 0.91 and 0.89, resp. Capillary permeability-surface product ratios ^{22}Na/tritiated water decreased with increasing blood flow reaching a relatively constant value below the free-diffusion constant ratio. This was interpreted as showing both substances do not cross the capillary barrier by simple diffusion through the same area. Back diffusion to blood of ^{86}Rb was reduced in the secreting state, with a simultaneous increase in its specific activity in the gastric secretion. It is suggested that Rb passes from blood to gastric secretion only through mucosal cells.

9793 THE EFFECT OF ARTERIAL pCO_2 ON GASTRIC MUCOSAL BLOOD FLOW MEASURED BY CLEARANCE OF Kr^{85}. (E.) Bell, P. R. F. (Western Infirm., Glasgow, Scotland) and A. C. Battersby. Surgery 62(3):468-474, 1967.

Gastric mucosal blood flow was measured by estimating the mucosal clearance of ^{85}Kr in order to investigate the effect of changes in arterial pCO_2; the problem of arteriovenous shunts was overcome by measuring the mucosal flow alone. Hypercapnia was induced in dogs by addition of CO_2 to inspired gases, commencing at 1% and ending at 12%; significant increases in flow were noted. In each animal, this increase in flow was max. at an arterial pCO_2 of 95-100 mm Hg. Hypocapnia was induced in dogs by progressively increasing the ventilatory vol.; hypocapnia caused significant reduction in mucosal flow with progressive reduction in arterial pCO_2. Four additional experiments were done to ensure that the changes in flow were not due to alterations in arterial pH; in 2 a metabolic alkalosis was progressively induced by admin. of 8.4% $NaHCO_3$, and in the remaining 2 a metabolic acidosis was induced by infusion of 2% lactic acid, the pCO_2 on each occasion being maintained within narrow limits by altering ventilatory vol. No significant change in flow occurred over a wide range of pH values with relatively constant pCO_2 (45±6 mm Hg), suggesting that the changes observed with changes in pCO_2 were not due to alteration in pH. It is suggested that pCO_2 should be monitored and maintained within narrow limits when estimates of gastric blood flow are being made under general anesthesia.

9794 HISTOCHEMICAL STUDY OF THE MUCOSUBSTANCES IN THE CANINE STOMACH. I. THE RESTING MUCOSA.

(E.) Gerard, A. (New York Med. Coll., N. Y.), R. Lev and G. B. J. Glass. Amer. J. Dig. Dis. 12(9):891-912, 1967.

Using histochemical and autoradiographic ($^{35}SO_4$) technics, 2 sulfated compounds of epithelial origin were identified in dog (17, mongrel) gastric (fundus and antrum) mucosa. One was a sulfated glycoprotein, produced by the surface epithelium, and the other a chondroitin sulfate A- or C-like material found in chief cells and pyloric glands; both glycoprotein and acid mucopolysaccharide probably contributed to the sulfated fractions found chemically in dog gastric juice. A sialidase-susceptible mucin was found predominantly within superficial cells of the antrum and fundus; this may be the source of the sialic acid found in the gastric secretions. A strictly neutral glycoprotein was found in the mucous neck and parietal cells, possibly indicating a relationship between these 2 cellular elements. In cells containing neutral and acidic mucins, the vicinal hydroxyl and anionic groups were judged to be in close proximity. Strong staining for basic protein was found in parietal cells and a less intense reaction in surface epithelium. S-containing amino acids were identified by direct and indirect technics in surface epithelium.

9795 ROLE OF INHIBITION OF GASTRIC MUCOUS SECRETION IN THE PHENOMENON OF GASTRIC MUCOSAL INJURY BY INDOMETHACIN.

(E.) Menguy, R. (U. Chicago, Ill.) and L. Desbaillets. Amer. J. Dig. Dis. 12(9):862-866, 1967.

Vagally denervated gastric-antral pouches de
void of acid-secreting mucosa were construct
in 5 dogs, who received 5 mg/kg of indometha
day for a 10-18 day test period. Three dogs
died suddenly after 10, 13 and 18 days, resp
of admin. of indomethacin; these all had
duodenal ulcers, 2 of which were perforated,
1 dog also had a large gastric ulcer. In al
dogs the rate of secretion of gastric mucus
decreased during admin. of the drug; this
decrease ranged from 21-36% of control value
The output of nondialyzable mucosubstance
decreased in all but 1 of the dogs, as did t
conc. of sialic acid. In 3 of the dogs the
conc. of L-fucose in mucosubstance was decre
there was no apparent relation between the
changes in the conc. of these 2 sugars, exce
in 1 dog, in which the least change in sial
conc. was accompanied by the largest decrea
in the conc. of L-fucose. The conc. of
hexosamines decreased in 3 dogs; neutral su
remained unchanged. In all dogs, the carbohydrate:protein
ratio dropped during the te
period. In the 2 surviving animals, the ra
of mucus secretion returned to control leve
during the period of recovery from the effe
of indomethacin; however, other values retu
more slowly and the av. remained depressed
comparison with control figures. These res
suggest that gastric mucosal injury by indo
methacin may be due to altered mucosal defe
mechanisms.

9796 ACTIVE TRANSPORT OF IONS BY THE GASTRIC MUCOSA OF THE RABBIT FOETU

(E.) Kendall, A. (Bedford Coll., London) a
G. H. Wright. J. Physiol. (London) 190(3):
531-540, 1967.

The short-circuit current and absolute flux
Na and Cl ions across the gastric mucosa of
28-day rabbit fetus were measured in vitro.
substitution of Na ion in the soln. bathing
mucosal surface by choline ion or K ion res
in a 70% decrease in short-circuit current
was reversed when Na ion was restored to th
mucosal soln. The portion of the short-ci
current dependent on the presence of Na ion
the mucosal soln. was found to be equivale
the net flux of Na ion from mucosa to sero
Net flux of Cl ion from serosa to mucosa w
compared with the short-circuit current wh
persisted when Na had been replaced in the
mucosal soln. The av. results from 16 exp
ments indicated that the net flux of Cl io
equivalent to 166% of the Na ion independe
short-circuit current. These findings sug
that the component of the short-circuit cu
associated with acid secretion was indepen
of the presence of Na ion in the mucosal s
The small scale of the experiments and the
secretion of mucus by the preparation did
allow simultaneous measurement of H ion se
tion and short-circuit current. Replaceme
Cl ion by sulfate ion or glucuronate in th
soln. on both sides did not result in a re

r decrease in the magnitude of the Na ion
ndependent short-circuit current, even after
llowing time for the tissue to become depleted
f Cl ion. It is hypothesized that a nonspecific
ctive anion transport was occurring.

797 ACCELERATED MOBILIZATION AND FORMATION
OF HISTAMINE IN THE GASTRIC MUCOSA
/OKED BY VAGAL EXCITATION. (E.) Kahlson, G.
J. Lund, Sweden), E. Rosengren and R. Thunberg.
Physiol. (London) 190(3):455-463, 1967.

nanges in the rate of histamine formation and
n the histamine content of the parietal-cell-
ontaining region of the gastric mucosa were
tudied in female Sprague-Dawley rats under the
nfluence of agents that evoke or abolish vagal
citation. The hypoglycemia-producing agents,
nsulin (5 I.U., admin. s.c.) and 2-deoxyglucose
00 mg/kg, admin. s.c.), raised the mucosal
stamine-forming capacity in a manner similar
that previously observed on refeeding, gas-
rin (10 μg/kg) inj. and distention of the wall
the stomach. In cats, insulin inj. elicited
elevation of mucosal histamine-forming
pacity similar to the corresponding effect of
nsulin in rats. Hoechst 9980 (piperidino-ethyl-
phenylacetamide, 0.1 mg/kg), which inhibits
ostganglionic cholinergic transmission, counter-
cted the elevation of mucosal histamine-forming
pacity after vagal excitation, but did not
hibit changes produced by gastrin, thereby
dicating the absence of a cholinergic inter-
diary link between gastrin and changes in
cosal histamine. It is emphasized that al-
ough vagus excitation, refeeding, gastrin and
stention all produced similar changes in
cosal histamine, the clarification of the pre-
se role of histamine as a natural stimulant
r the parietal cells may necessitate a different
nd of approach.

98 A COMPARISON OF TWO METHODS OF MEASURE-
MENT OF GASTRIC EMPTYING TIME. (E.)
ernish, S. M. (Indiana U. Sch. Med., Indiana-
lis), E. B. Young, B. D. Rosenak and C. E.
dman. Amer. J. Dig. Dis. 12(8):761-774, 1967.

o methods were used to determine the rate of
stric emptying time in 5 male subjects (47-67
. old). The test meal method was more diffi-
lt to perform, requiring positioning of the
tient, installation of a gastric tube, admin.
a test meal, removal of remaining meal from
e stomach at termination of a specified period
time, washing and redraining of the stomach,
alysis of aliquots from measured specimens and
alysis of each dialysate for content of a dye
dicator. The KI saliva test required only
min. of a known quantity of KI with a standard
al and determination of appearance time of
dide in the saliva using a starch indicator
ln. These tests were used to determine the
fects of 2 drugs, atropine (1 and 2 mg) and
teronium bromide (3.2 and 6.4 mg), on gastric
emptying and secretion. Both methods provided closely correlated relative potency values for both of the drugs. The test meal method showed that when admin. p.o. heteronium bromide had a significantly greater effect on gastric secretion than did atropine. This suggests that it may be possible to separate the effects of anticholinergic drugs on motility from the effects on secretion. When compared to atropine, heteronium bromide had a greater effect on gastric secretion than on gastric emptying; 1 mg of atropine was approx. equivalent to 4.2 mg of heteronium bromide, insofar as effect on gastric emptying was concerned. Thus, a dose of heteronium bromide which is equivalent to a given dose of atropine would exert a much greater effect on gastric secretion than would that dose of atropine. The doses of both drugs used in this study did not produce any unusual or excessive untoward reactions. It is suggested that, since clinical methods for screening drugs must be simple, rapid and reliable, the KI saliva test is preferable to the test meal method for this purpose.

9799 GASTRIC HYPERSECRETION FOLLOWING MASSIVE SMALL-BOWEL RESECTION IN MAN. (E.) Aber, G. M. (Queen Elizabeth Hosp., Birmingham, England), F. Ashton, M. H. B. Carmalt and T. P. Whitehead. Amer. J. Dig. Dis. 12(8):785-794, 1967.

A case report is presented of a 54-yr.-old man who had a massive intestinal resection for multiple arterial occlusion of the mesenteric vessels; most of the patient's jejunum, and all of his ileum, cecum and proximal colon were resected. After these operative procedures, the patient required repeated gastric aspiration and was shown to have gastric hypersecretion with a daily vol. of 2-4 liters, containing 200-500 mEq of H ion. This hypersecretion resulted in gross biochemical abnormalities which, along with their phase of correction, were studied in detail. After the second resection, Na, K, Cl and H ion conc. were remarkably constant in the gastric aspirate, being approx. 34, 8, 146 and 101 mEq/liter, resp. By the seventh postoperative day, the patient had a negative Cl balance of 389 mEq, Na retention amounting to 606 mEq and a negative K balance of 52 mEq, which had been reduced from a negative level of 249 mEq on the second postoperative day. From the time of the second resection to the seventh postoperative day, the serum Cl decreased from 98 to 84 mEq/liter, the serum K fell from 4.7 to 2.9 mEq/liter and serum Na rose from 132 to 144 mEq/liter. There was a progressive rise in standard bicarbonate from 24 mEq/liter on the day of the second operation to 41 mEq/liter by the seventh postoperative day. From the fourth to the seventh postoperative days, daily gastric losses of H ion were found to be between 200 and 500 mEq, while urinary excretion of net H ion varied between 50 and 100 mEq/day. The acid-base state of the patient was corrected by i.v. infusion of 666 mEq of ammonium chloride over the seventh to ninth postoperative days. Losses of H ion in gastric aspirate and in urine exceeded 400 mEq/day over the final 3 days of the patient's life. Autopsy confirmed the findings at laparotomy, and disclosed multiple infarcts of the liver, especially the left lobe, and kidney, as well as occlusion of the inferior mesenteric artery at its origin.

9800 QUANTITATIVE DETERMINATION OF GASTRIC INTRINSIC FACTOR AFTER LARGE HISTAMINE DOSES IN HEALTHY PERSONS. (E.) Rødbro, P. (Bispebjerg Hosp., Copenhagen) and P. M. Christiansen. Scand. J. Clin. Lab. Invest. 19(2): 186-189, 1967.

Production of gastric intrinsic factor was determined in 30 healthy volunteers (20 men, 10 women; av. age 44 yr.) without previous dyspepsia after large doses of histamine. Gastric juice in 1 basal hr. and in four 15-min. periods after stimulation with 0.04 mg histamine diphosphate/kg was collected; 30 min. before the s.c. inj. of histamine, 100 mg mepyramine maleate was admin. i.m. Intrinsic factor was determined radioimmunologically as the difference between total-vitamin B_{12}-binding capacity in gastric juice and the vitamin-B_{12}-binding capacity after complete blockage of the intrinsic-factor-vitamin-B_{12} binding capacity with intrinsic-factor antiserum. The av. secretion of gastric intrinsic factor after augmented histamine stimulation was 15,400±6,650 ng vitamin B_{12} U/hr. A modification of the protein-coated charcoal assay for intrinsic factor, using a variable between amounts of gastric juice and vitamin B_{12}, is described in detail. In this method, a fixed amount of vitamin B_{12} (10 ng) is used, and the vitamin B_{12}/gastric juice ratio usually varies from 50-500 ng vitamin B_{12}/ml gastric juice (using 20-200 μliters gastric juice in the single test). With this adaptation of the amount of gastric juice according to vitamin B_{12} binding capacity present, the highest radioactivity is in most tests found in the charcoal sediment (= free vitamin B_{12}); therefore, the vitamin B_{12} content in the supernatant (= vitamin B_{12} bound to gastric juice) is calculated from the radioactivity of the charcoal and the radioactive standard (= 10 ng vitamin B_{12}). Sufficiently high counts per min. are thus obtained with minute amounts of radioactive material in each test.

9801 EFFECT OF L-HYOSCYAMINE ON GASTRIC SECRETION OF ACID AND INTRINSIC FACTOR IN MAN. (E.) Dotevall, G. (U. Goteborg, Sweden), A. Walan and A. We nfeld. Gut 8(3):276-280, 1967.

Vol., HCl production and intrinsic factor output were studied in human gastric juice (from 7 male patients with chronic duodenal ulcer without hematological abnormalities) basally and after infusion with increasing doses of histamine before and during treatment with L-hyoscyamine;
the latter is the most active component of
atropine. The vol. of gastric juice increased
successively in the first 4 periods of histamin
stimulation. In spite of a 3-fold increase in
histamine dose from the fourth to the sixth
period, no further increase of vol. occurred.
Output of HCl increased successively in the
first 5 periods of histamine stimulation. During treatment with optimal effective doses of
L-hyoscyamine (which varied between 0.2-1.0 mg,
with a mean of 0.57 mg), the vol. and output of
HCl were lower basally and during stimulation
with low doses of histamine. In the last peric
when the largest doses of histamine were given,
there was no change in output when compared to
the pretreatment values. Output of intrinsic
factor increased notably during histamine
infusion; the output was largest during the
first 45 min. of stimulation after which a sli
decrease occurred; output of intrinsic factor
75-90 min. after beginning of histamine infusi
was still higher than during basal conditions.
Treatment with optimal doses of L-hyoscyamine
resulted in a higher output of intrinsic facto
during the basal period but the increase durin
stimulation with low doses of histamine, which
was very marked before treatment, was less pronounced during treatment. Total output of
intrinsic factor was not changed during treatment with L-hyoscyamine for 3 wk. These resul
agree with the suggestions of a "wash-out"
phenomenon for intrinsic factor secretion afte
stimulation with histamine. The continued hig
output of intrinsic factor 75-90 min. after th
start of a histamine infusion could be the
result of a late "wash-out" response or a dire
stimulatory effect by histamine on intrinsic
factor production.

9802 PANCREATIC METABOLISM OF Se^{75} SELENOMETHIONINE IN DOGS. (E.)
Van Goidsenhoven, G. E. (St. Louis U. Sch. Med
Mo.), A. F. Denk, B. A. Pfleger and W. A. Knig
Jr. Gastroenterology 53(3):403-411, 1967.

Acute and chronic experiments were conducted i
25 mongrel dogs to study the fate of i.v. inj.
^{75}Se selenomethionine, with special reference
its pancreatic metabolism after stimulation wi
pancreozymin and secretin. Radioactivity befo
and after protein precipitation with trichloro
acid was measured in urine, plasma, bile and p
creatic juice; radioactivity was also determin
blood and stools. Hepatic and pancreatic upta
were estimated from tissue homogenates. Bioch
determinations were performed to allow correla
with observed changes in radioactivity. After
i.v. inj., most of the label rapidly disappeai
from the plasma with a low point at 30 min., a
secondary peak at 24 hr., and then a slow decl
over a period of wk. Initially the radioactiv
was found in the trichloroacetic-acid-soluble
tion, but after the fourth hr. it was recovere
almost exclusively from the trichloroacetic-ac
precipitate and could be demonstrated in every
protein electrophoretic fraction. The label

o appeared in the circulating RBC. Some of
s activity could be traced very early after
. In spite of a higher conc. of ^{75}Se
enomethionine in the pancreas, the total
atic uptake exceeded the total pancreatic
ake. Excretion of radioactivity in pancreatic
ce became appreciable 1 hr. after inj. and
found almost exclusively in the trichloro-
tic-acid precipitate. The label appeared in
e and the excretion was relatively constant
ng the first 4 hr.; initially most of the
vity was found in the trichloroacetic-acid-
ble fraction, but with time a greater propor-
appeared in the precipitate. Approx. 80%
he label was excreted in the urine and feces
he end of 12 wk. Analysis of these results
a review of the literature indicate that
-selenomethionine is widely utilized in the
for the formation of a variety of proteins;
tissues show preferential uptake of this
l, but organ specificity is lacking.

THE INTERACTION OF SECRETIN AND PANCREO-
ZYMIN ON THE EXTERNAL PANCREATIC
ETION IN DOGS. (E.) Henriksen, F. W. (U.
nhagen) and H. Worning. Acta Physiol. Scand.
):241-249, 1967.

reatic secretion of fluid, protein and
rbonate in 4 mongrel dogs with chronic Thomas-
fistulae was studied in response to secretin
/kg), pancreozymin (1 U/kg) and combined
etin-pancreozymin (1 U/kg of each agent).
rates of secretion of fluid, bicarbonate and
ein after combined, submax. stimulation were
ly reproducible, as indicated by the
ficients of variation of 1.7% (fluid), 3.9%
arbonate) and 5.1% (protein). Secretion
s of fluid and bicarbonate obtained after the
ined stimulation with secretin-pancreozymin
close to those obtained after isolated
ulation with max. doses of secretin. Secretin
pancreozymin were shown to have a potentiat-
effect on the pancreatic secretion of
rbonate, but only an additive effect on pro-
secretion.

INTRADUODENAL GLUCOSE INFUSION AND
PANCREATIC SECRETION IN MAN. (E.)
P. T. (McGill U., Montreal, Canada) and
. Preshaw. Lancet 2(7511):340-341, 1967.

dio-opaque double-lumen duodenal drainage
was inserted into the duodenum of each of
bjects, 1 of whom had a duodenal ulcer, and
her of whom had abnormal glucose tolerance.
r infusion of 0.15 M NaCl soln. for a con-
period of at least 1 hr., glucose soln.
ing from 2.5-20.0% were infused for consecu-
30-min. periods. Finally, 0.05 M citric
was infused for 30 min. Duodenal collec-
s were analyzed for bicarbonate and protein.
sion of glucose had no effect on the recovery
luid, bicarbonate or protein from the
enum, but in each case an infusion of citric
acid caused an increase in the recovery of fluid and bicarbonate. Gastric secretion was not stimulated by any test soln. It is concluded that intraduodenal infusion of glucose in man has no effect on external pancreatic secretion.

9805 POTENTIATION OF SECRETIN STIMULATION OF THE PANCREAS. (E.) Brown, J. C. (U. Newcastle upon Tyne Med. Sch., England), A. A. Harper and T. Scratcherd. J. Physiol. (London) 190(3):519-530, 1967.

Stimulation of the dorsal vagus trunk in fasted anesthetized cats (which were secreting pancreatic juice at a steady slow rate in response to continuous i.v. infusion of secretin) produced an increase in the rate of secretion, the rate of output of amylase and in the conc. of bicarbonate in the juice. Atropine reduced, but did not abolish, the increase in rate of secretion and in conc. of bicarbonate; it was unaffected by adrenergic blocking agents, but abolished by hexamethionium. No increase in rate of secretion of secretin-stimulated juice was noted on cervical stimulation of vagus nerves in which the efferent fibers had degenerated after supra-nodose section of the nerves. It is suggested that the increase in secretion rate is mediated by atropine-resistant efferent vagal fibers. The rate of secretion of secretin-stimulated juice was increased by histamine, antral extracts and pancreozymin. The latter two also increased the rate of amylase output. Atropine or hexamethonium did not abolish these effect of pancreozymin and antral extracts. Since vagal stimulation, histamine, antral extracts and pancreozymin have little or no effect on the resting pancreas of the anesthetized cat, it is concluded that they exert a potentiating effect on secretin; it is suggested that the mechanism of this potentiation is an increase in pancreatic blood flow, which facilitates the supply of secretin to the gland.

9806 STUDY OF PANCREATIC EXOCRINE SECRETION IN HUMANS AFTER TEST MEAL FEEDING. (It.) Dal Monte, P. R. (U. Bologna, Italy), E. Fiore, L. Lodi and R. Cremonini. Boll. Soc. Ital. Biol. Sper. 43(4):161-165, 1967.

The effects of p.o. feeding of a test meal (45 g skimmed milk; 45 g corn oil; 25 g glucose; brought to 300 ml by adding water) on pancreatic exocrine secretion were studied in 28 subjects of both sexes (age 23-57 yr.) with no evidence of gastrointestinal pathology. Subjects were fasted for 12 hr. before feeding; pancreatic juice samples were collected before feeding and after feeding (at 30-min. intervals for 2 hr.) by insertion of an Einhorn tube as far as the second portion of the duodenum and first portion of the jejunum. Trypsin determination was performed mainly by the Nagel spectrophotometric method; amylase determination by the Rice method. The av. vol. of pancreatic juice was 47 ml before feeding; after feeding, the av. vol. was

79 ml after 30 min., 101 ml after 60 min., 78 ml after 90 min., and 72 ml after 120 min., for a total av. secretion of 331 ml. Amylase levels (av.) were 19,900 mU before feeding, and 39,700 mU at 30 min., 42,600 mU at 60 min., 38,300 at 90 min., and 29,400 mU at 120 min. after feeding; total 150,000 mU. Trypsin levels (av.) were 1300 mU before feeding, and 2917 mU at 30 min., 3978 mU at 60 min., 2873 mU at 90 min., and 2861 mU at 120 min. after feeding; total 12,629 mU. Results indicate that the test meal admin. is a potent stimulus of pancreatic secretion and enzyme activity, with max. values of each observed 1 hr. after feeding. No washout of pancreatic enzyme activity was seen. The authors feel that the above method is a valid and sensitive way to study pancreatic exocrine secretion.

9807 THE EFFECT OF CRUDE SECRETIN IN MATURITY-ONSET DIABETES MELLITUS. (E.)

Persson, I. (Frederiksberg Hosp., Copenhagen), F. Juhl and D. Svendsen. Lancet 2(7513):445-446, 1967.

The effect of crude secretin (100 U) was studied in 5 groups of patients: 1) 27 with maturity-onset diabetes mellitus (46-83 yr. old; av. age 66 yr.; duration of diabetes ranged from 6 mo.-18 yr., av. 7 yr.; 8 patients were obese); 2) 5 with juvenile diabetes (av. age 30 yr., av. duration, 20 yr.; all were receiving insulin); 3) 13 patients who were obese and hypertensive, and thus predisposed to diabetes mellitus; 4) 9 with neurosis and arthritis, but no disposition to diabetes, and who served as controls; and 5) a control group of 6 patients with maturity-onset diabetes who received an i.v. inj. of insulin, 0.1 I.U., and glucagon, 400 ng (stabilized with albumin) in the same amounts as were present in the crude secretin. The results were analyzed by grouping the patients into 3 categories as follows: Group A, previously Groups 1 and 5; Group B, previously Group 2; and Group C, previously Groups 3 and 4. Group A showed a fall in the blood-sugar during the period of study, Group B had a rise, and Group C showed a 20-min. fall after which the blood-sugar reverted to the initial values. It is concluded that the fall in the blood-sugar level observed in maturity-onset diabetes, but not in the other groups, was due only to the secretin or to another substance in the duodenal extract; the control experiments showed that the effect was not due to insulin or glucagon.

9808 INTESTINAL HORMONES AND PLASMA INSULIN: AN INSULINOTROPIC ACTION OF SECRETIN.

(E.) Boyns, D. R. (Guy's Hosp., London), R. J. Jarrett and H. Keen. Brit. Med. J. 2(5553): 676-678, 1967.

The effect of endogenous secretion on the plasma immunoreactive response to i.v. glucose was studied in 5 healthy men, ranging in age from 25-40 yr. old. The effect of purified porcine secretin was compared with that of cholecystokinin/pancreozymin (1500 Ivy dog units/mg admin. as 50 μg/20 ml saline i.v. 1 ml/min.). I.v. admin. of purified secretion (20,000 clinical U/mg admin. as 6 μg/20 ml saline at 1 ml/min.) raised the level of fasting venous plasma immunoreactive insulin, and increased the immunoreactive insulin response to i.v. 5% glucose (20 g/hr.). By contrast, endogenous secretin (stimulated by intraduodenal infusion of 0.05 N citric acid instillation admin. 5 ml/min. for alternate min. for 20 min.) did not cause a rise Cholecystokinin/pancreozymin had no effect. Endogenous secretin did not augment the plasma immunoreactive insulin levels obtained during i.v. glucose infusion. It is believed that secretin is insulinotropic only in unphysiologic quantities.

9809 EFFECT OF TESTOSTERONE AND DUCT LIGATIO ON SUBMAXILLARY RENIN-LIKE PRINCIPLE.

(E.) Oliver, W. J. (CIBA, Ltd., Basel, Switzerland) and F. Gross. Amer. J. Physiol. 213(2): 341-346, 1967.

The renin-like principle of the submaxillary gland of the white mouse has greater activity in males than in females throughout the lifespan of 3-36 wk. Dependence of this difference on male sex hormone was demonstrated by 1) reduction in renin-like activity in males after castration; 2) restoration of activity in castrated males by therapy with testosterone; and 3) enhanced activity in females given testosterone treatment After ligation of the common submaxillary duct, renin-like activity decreased within 3 days; it was nearly undetectable after 7 days. These results suggest that the renin-like substance present in the mouse submaxillary gland is one of the androgen-dependent proteolytic enzymes of the excretory ducts and is associated with exocrine function of the gland. Its specific function is unknown.

9810 EXCRETION OF SODIUM AND POTASSIUM IN CAT SUBMANDIBULAR SALIVA. (E.)

Petersen, O. H. (U. Copenhagen) and J. H. Poulse Acta Physiol. Scand. 70(2):158-167, 1967.

Cat submandibular gland secretion was elicited by chorda stimulation, and the conc. of Na and K in the saliva were determined by flame photometr Na conc. in the initial samples of cat submandibular saliva taken from a previously resting gland were higher than the Na conc. in samples taken later at an identical secretory rate. The max. difference in conc. between transient and steady-state sample was approx. 50 mEq/liter. Steady state conc. of Na increase proportionally to the flow rate, except at low flow rates where Na conc. were greater than expected on the basis of this relation. Steady state conc. of K were independent of the secretory rate when this was higher than 100 μliters/min./g of gland, with a value of approx.

mEq/liter. Below this flow rate, the K conc.
se, first slightly and then steeply, when flow
te decreased, and reached values of more than
0 mEq/liter at secretory rates of approx.
μliters/min./g of gland.

11 IMPULSE FREQUENCY IN SECRETORY NERVES OF SALIVARY GLANDS. (E.)

Emmelin, N.
. Lund, Sweden) and J. Holmberg. J. Physiol.
ondon) 191(1):205-214, 1967.

dogs under pentothal anesthesia the sub-
xillary duct was exposed in the neck and a
lythene tube inserted into it; during the
llowing days, the animals were examined re-
atedly, standing in a frame. The highest rates
submaxillary secretion evoked by introducing
rious foodstuffs or rejectable substances into
e mouth were estimated. Finally, the dogs were
esthetized and the rates of salivary flow were
ecorded during electrical stimulation of the
ordalingual nerve at different frequencies.
e frequency-response curve for electrical
imulation had a steep slope up to a frequency
10/sec., where a salivary flow at a rate of
oprox. 90% of the max. was evoked. The fastest
ecretion that was obtained reflexly on feeding
orresponded to a flow which in different experi-
ents varied between 4 and 8 shocks/sec. The
apid secretion caused by rejectable substances
ould be reproduced by stimulating at 10-30/sec.
similar experiments on the parotid gland
oodstuffs were often, and rejectable substances
lways, found to cause a salivary flow at a rate
at exceeded that obtained on max. stimulation
f the auriculotemporal nerve; the finding
upports the view expressed by previous investi-
ators that additional secretory fibers reach
he parotid gland of the dog by anatomically
nknown routes.

812 PATTERN OF SECRETION OF PANETH CELLS OF THE SMALL INTESTINE OF MICE. (E.)

rier, J. S. (U. Wisconsin, Madison), V. Lorenzsonn
nd K. Groehler. Gastroenterology 53(2):240-249,
967.

he pattern and rate of secretory granule synthesis
nd secretion was studied in adult male white
ice after fasting, feeding and pharmacological
oses of atropine (4 mg dissolved in 0.4 ml of
.9% NaCl, admin. i.p.) and pilocarpine (0.5 mg
issolved in 0.5 ml of 0.9% NaCl, admin. i.p.).
ice were sacrificed 15 min.-24 hr. after receiv-
ng L-leucine-3H i.p. to pulse label newly
synthesized protein. Microautoradiographs of
smium-fixed, epoxy-resin embedded jejunum were
repared to follow the intracytoplasmic location
of label. Distribution of radioactivity within
Paneth cells was determined quantitatively using
coded, randomized slides without foreknowledge
regarding the source of tissue specimens. After
leucine-3H admin. to fasted mice, label was most
abundant in the basally located endoplasmic
reticulum after 15-30 min., in the Golgi region after 1 hr., and in the apical cytoplasm of Paneth cells after 5-6 hr. By 12 hr., over 90% of Paneth cells no longer had significant labeling. Feeding of a diet containing fat, protein and carbohydrate did not stimulate granule synthesis or secretion. Pharmacological doses of pilocarpine enhanced both synthesis and secretion. Atropine inhibited secretion, but did not appear to interfere with normal granule synthesis. These observations provide firm evidence that Paneth cells not only have great secretory potential, but are characterized by continuous synthetic and secretory activity, even in fasted mice. This active basal secretion was not enhanced by feeding under the present experimental conditions, but was stimulated by pilocarpine and inhibited by atropine.

9813 PERIODIC SECRETION OF INTESTINAL GLANDS IN DOGS UNDER EMOTIONAL STRESS. (Rus.)

Maevskaia, N. V. (Donets Med. Inst., USSR) and Y. V. Linevskii. Biull. Eksp. Biol. Med. 63(5): 15-17, 1967.

Emotional stimulation lasting 60 min. in 2 dogs and 4 hr. in 1 dog was induced by showing the dogs a cut during the second hr. or throughout the experiment. Thiry or Thiry-Vella isolated fistulas were made in the initial part of the jejunum. During normal conditions enterokinase activity varied between 20-506 U/g homogenate, phosphatase content fluctuated between 900-25000 U and the enzyme excretion/1 hr. was more stable. After 60 min. or 4 hr. of aggressive reaction periodical secretion from the intestinal glands was significantly increased; in dogs with a longer aggressive reaction the secretion increased and was especially marked 2 days after emotional stimulation. In the dog with shorter aggressive reaction enzyme secretion increased due to marked increased conc. in juice. Total amount of secretion was in the region of control values, however, secretion of the solid part of the juice was 0.93 g/4 hr. as compared to 0.08-0.47 g in controls; enzyme content/g of the solid part of the juice increased approx. 2-fold. In the dog with longer aggressive reaction, enzyme excretion after emotional stimulation was not accompanied by conc. changes in the juice since there was a marked increase of separation of the fluid part of intestinal juice at that time. Enterokinase and phosphatase secretion usually changed in parallel to each other.

9814 THE INFLUENCE OF GASTRIN ANALOGUES AND 2-DEOXY-D-GLUCOSE ON BILE SECRETION. (E.)

Konturek, S. J. (Med. Sch., Cracow, Poland), A. Kieta-Fyda and K. Moczurad. Amer. J. Dig. Dis. 12(9):955-961, 1967.

Adult cats were prepared with gastric and biliary fistulas, and the influence of the following stimulants upon bile secretion was assessed: 2 gastrin analogs (a pentapeptide and a tetrapeptide), histamine, 2-deoxy-D-glucose, and saline. Both gastrin analogs and histamine effectively stimulated hepatic bile flow, the peak response being reached in the second or third 30-min. period. There was no difference between the responses to pentapeptide in doses ranging from 20-80 μg/kg; this was also true when either half or twice the dose of tetrapeptide was used. Admin. of 2-deoxy-D-glucose or saline alone did not result in any change in hepatic bile flow. A significant increase of bicarbonate output was found only after tetra- or pentapeptide inj. Histamine and 2-deoxy-D-glucose were ineffective in bicarbonate stimulation. Usually a slight increase of bicarbonate conc. occurred after application of the gastrin-related peptides, whereas no change or decrease was observed after histamine or 2-deoxy-D-glucose admin. No significant change in Cl output or conc. occurred after inj. of any stimulant; bile salt outputs were also not significantly influenced by the stimulants admin. They showed a progressive decline caused by bile drainage to the outside and the resulting interruption of their enterohepatic circulation. The pH level of the duodenal contents was 7.62 ± 0.15.

9815 THE EFFECT OF HETERONIUM BROMIDE ON BASAL GASTRIC SECRETION AND ON GASTRIC SECRETION "MAXIMALLY" STIMULATED BY HISTALOG AND BY INSULIN. (E.) Zaterka, S. (U. Sao Paulo, Brazil), S. Honda and D. P. Neves. Arq. Gastroent. (Sao Paulo) 4(1):39-43, 1967.

9816 ROLE OF THE GASTRIC ANTRUM AND THE VAGUS NERVES IN THE INHIBITION OF GASTRIC SECRETION BY DUODENAL ACIDIFICATION. (E.) Pappas, G. Minneapolis, University of Minnesota Thesis, M. S. in General Surgery, 1966, 71 pp.

9817 COMPARISON BETWEEN TOLBUTAMIDE AND INSULIN AS A STIMULATOR OF GASTRIC SECRETION IN MAN. (Sp.) Laudano, O. M. (Fac. Sci. Med., Rosario, Argentina), J. Moroni and H. Maturo. Dia Med. 39(41):774-775, 1967.

9818 THE CLINICAL PHARMACOLOGY OF THE STOMACH AND ITS RADIOTELEMETRIC INVESTIGATION. (Rus.) Fishzon-Ryss, Iu. I. (Kirov Milit. Med. Acad., Leningrad, USSR) and V. A. Timakov. Klin. Med. (Moskva) 45(5):136-141, 1967.

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9820 EFFECT OF ANISOTROPINE METHYLBROMIDE ON HUMAN SALIVA FLOW AND GASTRIC SECRETION. (E.) Steil, J. N. (Roy. North Shore Hosp., Sydney, Australia) and C. H. Baxter. Med. J. Aust. 1(21): 1076-1078, 1967.

9821 STUDIES ON SALIVARY SECRETION INDUCED
BY ELECTRICAL STIMULATION OF THE
AURICULOTEMPORAL NERVE WITH SPECIAL REFERENCE T
SALIVARY FLOW AND AMYLASE ACTIVITY. (Jap.)
Yamamoto, I. (Osaka U. Dent. Sch., Japan), R.
Inoki, S. Kojima and Y. Tamari. Nippon Yakurig
Zasshi (Folia Pharmacol. Jap.) 63(3):153-160, 1

9822 PHARMACOLOGICAL STUDIES ON AMYLASE
SECRETION FROM RABBIT PAROTID GLAND.
I. ROLE OF SYMPATHETIC NERVOUS SYSTEM ON AMYLA
SECRETION INDUCED BY PARASYMPATHETIC NERVE STIM
TION. (Jap.) Kojima, S. (Osaka U. Dent. Sch.,
Japan). Nippon Yakurigaku Zasshi (Folia Pharma
Jap.) 63(3):161-168, 1967.

9823 PHARMACOLOGICAL STUDIES ON AMYLASE
SECRETION FROM RABBIT PAROTID GLAND.
II. ON ADRENERGIC RECEPTORS IN AMYLASE SECRETI
(Jap.) Kojima, S. (Osaka U. Dent. Sch., Japan)
Nippon Yakurigaku Zasshi (Folia Pharmacol. Jap.
63(3):169-178, 1967.

9824 INHIBITORY ACTION OF CERTAIN POLYPEPT
BIOLOGICALLY ACTIVE ON PAROTID SECRET
IN THE DOG. (Rum.) Groza, P. (Danielopolu
Physiol. Inst., Bucharest), V. Buzoianu, M.
Corneanu and S. Ionescu. Fiziol. Norm. Pat.
13(4):299-306, 1967.

9825 HUMAN SALIVARY CONDITIONING: EFFECT
UNCONDITIONED-STIMULUS INTENSITY. (E
Feather, B. W. (Duke U., Durham, N. C.), F. C.
Delse and M. R. Bryson. J. Exp. Psychol. 74(3)
389-392, 1967.

9826 THE SALIVARY SECRETION AND CLEARANCE
IN THE HORSE OF CHLORAL HYDRATE AND I
METABOLITES. (E.) Alexander, F. (Roy. Sch. Ve
Studies, Edinburgh, Scotland), M. W. Horner and
M. S. Moss. Biochem. Pharmacol. 16(7): 1305-1311, 1967.

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Sobocińska, J. (Warsaw Sch. Med.) and
S. Kozłowski. Bull. Acad. Pol. Sci. [Biol.] 15
295-299, 1967.

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DENERVATED SUBMAXILLARY GLANDS OF RAT
(E.) Ohlin, P. Lund, Gleerup, 1965, 12 pp.

9830 SECRETORY MECHANISMS OF SALIVARY GLAN
PROCEEDINGS. (E.) Schneyer, L. H. a
C. A. Schneyer. (Eds.). New York, Academic Pr
1967, 389 pp., $13.50.

See also abstract nos.: 10335,10337

31 STUDIES ON INTESTINAL DIGESTION OF
STARCH IN MAN. II. INTESTINAL
DROLYSIS OF AMYLOPECTIN IN INFANTS AND CHILDREN.
) Auricchio, S. (U. Naples, Italy), D. Della
etra and A. Vegnente. Pediatrics 39(6):853-862,
57.

ne normal infants and 4 children between the
es of 2.5 and 28 mo. were fed powdered milk to
ich dextro-maltose and (from the beginning of
e 4th mo.) 4 g of flour/kg of body wt. had been
ded. Starchy foods were given from the end of
e fourth mo. Also examined was a 26-mo.-old
ild with exudative enteropathy of unknown etiol-
/ who had been treated successfully for the
st 3 mo. with prednisolone. The test meal con-
ined amylopectin (about 9 g/100 ml), casein
g/100 ml) and vegetable oil (4 g/100 ml) and
epared by dissolving, without heat, 50 g of
ylopectin in 500 ml H_2O by shaking for 60 min.
infants at the end of the first yr. of life
d in small children the amylopectin is very
pidly hydrolyzed into glucose, maltose, malto-
iose, and branched dextrins; these compounds are
kely hydrolyzed into glucose by the action of
cosal glucosidases. Infants up to 6 mo. of
e showed incomplete intestinal hydrolysis of
ylopectin with an accumulation of considerable
ounts of dextrins in excess of 30 glucose U.
ong the small oligosaccharides, a decrease in
e glucose and maltose content as well as an
crease in the maltotetraose content was noted.
e incomplete digestion of amylopectin is a con-
quence of the low levels of α-amylase activity
duodenal juice after the meal. In contrast,
e mucosal α-disaccharidases, with the single
ception of maltase I, are already present at
ult levels in the newborn. The incomplete
amylolysis of starch in the duodenum would be
pected to give a relatively high frequency of
arch malabsorption in the first yr. of life
cause in such young children the intestine
obably has little reserve capacity for the
gestion of starch.

32 LACK OF PROTEOLYTIC DIGESTION IN THE CAUSATION OF PERNICIOUS ANAEMIA. (E.) Mooney, F. S. (St. Helen's Hosp., Lancashire, England) and J. G. Heathcote. Lancet 2(7512): 397-399, 1967.

Experimental evidence is presented that, in casein, vitamin B_{12} is almost entirely bound to the protein in a non-dialyzable form, and that progressive release of the bound vitamin occurs simultaneously with the release of α-amino N under the influence of alimentary proteases. This in vitro evidence suggests that the release of vitamin B_{12} from bound protein and digestion of the protein itself to smaller components occur simultaneously and progressively in a logical manner. These findings do not support the view that the vitamin binds itself to any large molecule during the normal stages of digestion, but rather they support a previously expressed concept that the primary cause of pernicious anemia is merely a lack of proteolytic digestion.

9833 EXCRETION OF CALCIUM BY THE PANCREAS. (Uk.) Oleinik, I. F. (Bogomoletz Inst., Kiev, USSR). Fiziol. Zh. (Kiev) 13(4):477-482, 1967.

9834 STEREOCHEMICAL INVESTIGATION OF THE ACTIVE CENTER OF PEPSIN USING A NEW INACTIVATOR. (E.) Erlanger, B. F. (Columbia U. Coll. Physicians Surg., New York City), S. M. Vratsanos, N. Wassermann and A. G. Cooper. Biochem. Biophys. Res. Comm. 28(2):203-208, 1967.

9835 PURKYNJE'S STUDIES OF DIGESTION. (Cz.)(Rev.) Kruta, V. Cesk. Gastroent. Vyz. 21(1):1-12, 1967.

9836 ESTEROLYTIC ACTIVITY OF HUMAN GASTRIC JUICE. (E.) Szafran, H. (Cracow Med. Sch., Poland), T. Popiela and Z. Szafran. Bull. Acad. Pol. Sci. [Biol.] 15(5):245-249, 1967.

9837 PHYSIOLOGY AND PATHOLOGY OF ADSORPTION (CONTACT) DIGESTION. (Rus.) Ugolev, A. M. Leningrad, Nauka, 1967, 229 pp., $1.50.

9838 NERVOUS FACTORS INFLUENCING THE MEMBRANE ACTIVITY OF INTESTINAL SMOOTH MUSCLE.

(E.) Kuriyama, H. (Kyushu U., Japan), T. Osa and N. Toida. J. Physiol. (London) 191(2):257-270, 1967.

The effects of various chemical agents on the spontaneous membrane activities and those elicited electrically in the smooth muscles of the small intestine (chiefly, longitudinal muscle of the jejunum of the guinea pig) were studied. With regard to the effects of various chemicals on the spontaneously active membrane, atropine slightly hyperpolarized the membrane and reduced the amplitude of slow potential changes, even in aged preparations. Prostigmine depolarized the membrane, and enhanced the amplitude and prolonged the duration of the slow potential changes. Atropine prevented the actions of prostigmine on the membrane. Ba ion depolarized the membrane, and enhanced the amplitude and prolonged the duration of the slow potential changes; the spike frequency was initially increased, and then it was reduced. Atropine and tetrodotoxin partially prevented the action of Ba ion on the membrane activities. Effects of chemical agents on the membrane activity elicited by electrical stimulation showed that short pulse stimulation (0.5-1.0 msec.) generated the spike as a direct response of the muscle cell membrane, then it was followed by slow depolarization, delayed hyperpolarization (i.e., the inhibitory potential) and post-inhibitory rebound, successively. The slow depolarization and the post-inhibitory rebound were reduced in amplitude by treatment with atropine, and enhanced by treatments with prostigmine and Ba ion. Tetrodotoxin blocked all activities, except the spike. When repetitive stimulation (20 cycles/sec.) was applied to the membrane, the membrane hyperpolarized; then, after 3-5 sec., it gradually depolarized (even if the stimulation was continued) and triggered spikes. Hyperpolarization always preceded depolarization. The duration and the amplitude of the delayed depolarization was proportionally increased by the increased intensity and duration of stimulation. Tetrodotoxin and atropine blocked the generation of the post-inhibitory rebound. The effects of repetitive stimulation on the stored tissues were noted; the responses to repetitive stimulation of the membrane of muscles which had been stored 50 hr. at 4°C were the same as those observed in the fresh tissue. Response of tissue which had been stored 100 hr. was the same as that observed in the fresh tissue treated with tetrodotoxin, i.e., all activities, except the spikes, were blocked.

9839 ELECTROPHYSIOLOGICAL STUDY OF THE INTESTINAL SMOOTH MUSCLE OF THE GUINEA-PIG.

(E.) Kuriyama, H. (Kyushu U., Japan), T. Osa and N. Toida. J. Physiol. (London) 191(2): 239-255, 1967.

The membrane properties of single cells of intestinal smooth muscle of duodenum, jejunum, ileum, cecum and rectum of the guinea-pig were investigated. The membrane potentials of longitudinal muscles of these 5 regions varied from 54-56 millivolts, and those of circular muscles of jejunum, ileum, cecum and rectum varied from 57-60 millivolts. The ablated longitudinal musc had a slightly lower value (50 millivolts) than the intact one. Longitudinal muscle generated spontaneous discharges but these were rare in th circular muscles of the intestine, except for the cecum. Overshoot potentials could be observ in all regions of the intestine. The max. rate of rise of spontaneously discharging longitudina muscles varied from 11-18 volts/sec. Not all of the slow potential changes were generated by the nervous elements distributed between the muscle layers and in them. Conduction velocities measu from the longitudinal muscles of jejunum and rec in the presence of tetrodotoxin were 2.1 cm/sec. and 4.0 cm/sec., resp. Chronaxies of the longitudinal muscles of jejunum and rectum were 2-5 msec. and 5-18 msec., resp. Intracellular stimulation of the single cells of the duodenum and cecum could trigger a spike, similar to that observed in the taenia coli. Most of the spikes were graded; a spike of full size was rarely elicited. When spikes were triggered, the after-hyperpolarization appeared consistently, presumably caused by the increased K conductance. The effective membrane resistance and the time constant were measured for the longitudinal muscles of the rectum and jejunum; when spikes were generated by intracellular stimulation, the observed values were 40-50 megohms, and 3-5 msec. in both tissues; these values were the same as those seen in the taenia coli. When the time constant of the membrane was measured by the extracellular polarizing method, the longitudina muscles of the jejunum (especially) and the rect had smaller time constants than the taenia coli. The differences of conduction velocity and chronaxie of the different regions of the intestine are discussed in relation to the cable propertie of the tissues which are directly influenced by the morphological arrangements of the tissues.

9840 EFFECT OF CHOLECYSTOKININ ON SMALL INTESTINE.

(E.) Hedner, P. (U. Hosp., Lund, Sweden), H. Persson and G. Rorsman. Acta Physiol. Scand. 70(2):250-254, 1967.

The effect of highly purified cholecystokinin on gallbladder and intestine (ileum) was studied *in vivo* (on 10 cats of either sex) and *in vitro* (on 65 guinea pigs of either sex). The purified cholecystokinin preparation contained 4000 Ivy dog U/mg; and a crude preparation contained 200 U/mg. The purified preparation caused a contraction of the guinea pig ileum which was proportio to the dose admin.; activity of the purified preparation was 21.8 times greater/mg than that of the crude preparation. Atropine in doses of approx. 0.1 µg completely inhibited responses of

 acetylcholine and of 4 U of cholecystokinin.
honium in doses up to 100 μg did not affect
ponse to cholecystokinin. Guinea pig gall-
 responded to cholecystokinin in lower doses
ose required to obtain a contraction of the
 the lowest effective dose was 0.3 Ivy dog
lay of the response was seen, and with in-
g doses the lag period decreased. Atropine
se of 0.2 μg, which inhibited the response
 acetylcholine, left the response to 0.6 U
ecystokinin unaffected; no reduction of the
e to cholecystokinin could be observed,
ter an increase of the atropine dose to
 In vivo experiments showed that after
 of cholecystokinin admin. i.v. (4000 Ivy
g), the gallbladder pressure increased from
 2 mm Hg to approx. 10 mm Hg. Pressure in
junum usually did not exceed 15 mm Hg in
trol period; after cholecystokinin the basic
as elevated approx. 10 mm Hg above the con-
vel, and there were frequent pressure peaks
t duration up to 55 mm Hg. After treatment
ropine (2 mg/kg) the intestinal response to
stokinin was inhibited but the response of
lbladder remained completely unaffected.
oncluded that the contraction of the small
ine elicited by cholecystokinin preparations
 to the hormone itself and not to impurities
 preparations; this intestinal effect is
ed by another mechanism of action than the
 of the hormone on the gallbladder; chole-
inin in low conc. appears to have a specific
 on the proximal part of the intestine. It
sible that the hormone may play a role in
gulation of intestinal motility.

MECHANICAL RESPONSES OF INTESTINAL SMOOTH
MUSCLE IN A CALCIUM-FREE MEDIUM. (E.)
z, L. (Vanderbilt U. Sch. Med., Nashville,
, P. D. Joiner and S. Von Hagen. Proc.
xp. Biol. Med. 125(2):518-522, 1967.

udinal fibers from guinea-pig ileum under-
 transient increase in muscle tone when they
ransferred from a physiological salt soln.
a-free soln.; composition of the physiological
oln. was as follows: NaCl, 125 mM; KCl,
; $CaCl_2$, 1.8 mM; glucose, 11 mM; and tris
hydroxymethyl)aminomethane, Sigma-trizma
 buffer, 23.8 mM. The magnitude and duration
 contractile response was enhanced if the
 was preincubated in a high Ca medium
). The length of time that the muscle was
ubated in the high Ca medium influenced the
ude of the response, as well as the amount
racellular Ca accumulated by the fibers.
chanical changes initiated by removing ex-
lular Ca ions were accompanied by a pronoun
d increase in the unidirectional efflux of
s. The addition of acetylcholine or a high
um (identical in composition to the physio-
l salt soln., except that all the NaCl was
ed by an equimolar quantity of KCl) enhanced
ne of a muscle that was partially contracted
a-free medium. The addition of 1.8 mM
 depressed it. However, when the same conc.
of $CaCl_2$ was added in the presence of acetylcholine or a high K medium, it enhanced muscle tone even more. It is suggested that acetylcholine, a high K medium and a Ca-free medium, by increasing membrane permeability, accelerated the migration of Ca ions from an intracellular locus to the cytoplasm; these findings also suggest that they accelerate the movement of Ca ions between the external soln. and the cytoplasm of the muscle fiber.

9842 ELECTRICAL PROPERTIES OF INTESTINAL MUSCLE AS MEASURED INTRACELLULARLY AND EXTRACELLULARLY. (E.) Kobayashi, M. (U. Illinois, Urbana), C. L. Prosser and T. Nagai. Amer. J. Physiol. 213(1):275-286, 1967.

In vitro measurements of electrical properties were made on muscle of duodenum or jejunum from cats, and in vivo measurements were made on intestines of dogs. Slow waves recorded extracellularly by wicks in air or by implanted wires in vivo were positive, just as those recorded intracellularly by pressure or microelectrodes; wicks recorded negative slow waves in vol. conditions. Unlike slow waves, spikes reversed polarity between inside and outside in air or implantation. Slow-wave amplitude was max. in the middle of the muscularis. Failure of polarity reversal may have been due to pressure effects of wick or implanted wire, and also to source-sink relations within fields of synchronous activity. Resistance of longitudinal muscle fibers was 52 megohms, that of quiescent circular fibers was 68 megohms, and that of circular fibers showing induced slow waves was 58 megohms. Resistance between adjacent longitudinal fibers was 16 megohms, specific protoplasmic resistance was 222 ohms cm. The time constant with intracellular electrodes in a bridge circuit was 10 msec. for longitudinal fibers, 21 msec. for circular fibers. With extracellular or pressure electrode stimulation, time constants were 52-105 msec. for longitudinal fibers. Space constants measured with extracellular stimulation were 1-1.5 mm, whereas those calculated for intracellular stimulation were 118 μ. With paired intracellular electrodes of 7-70 μ, separation electrotonic coupling was 70-80%, at wider separations it approached 0. It is concluded that the effective conducting unit appears to be a bundle rather than a chain of single cells.

9843 CONFIGURATION OF INTESTINAL SLOW WAVES OBTAINED BY MONOPOLAR RECORDING TECHNIQUES. (E.) Bortoff, A. (State U. New York Upstate Med. Ctr., Syracuse). Amer. J. Physiol. 213(1):157-162, 1967.

In vitro and in vivo recordings of intestinal slow waves in cat jejunum, made with extracellular, monopolar electrodes, showed that the so-called intermediate form of the wave consisted of an abrupt positive deflection followed by a negative notch and then by a somewhat more positive plateau that gradually subsided to the original potential level. The phenomenon resulted from a combination or superposition of the propagated monophasic slow wave and its associated field potential. Which form predominated depended on the relative magnitude of the shunting resistance around the tip of the recording electrode. When the shunting resistance was high, the monophasic form, representing the temporal course of membrane potential, predominated; as shunting resistance decreased, the field potential, representing the temporal course of membrane current, became predominant. It is concluded that the intermediate form of the wave can not be interpreted in terms of electrical changes at the membrane level unless the time courses, polarities and magnitudes of each of these components are known.

9844 CHARACTER OF CONTRACTIONS AND RATE OF TRANSIT OF CHYME IN THE SMALL INTESTINE DURING THE USE OF DIFFERENT TYPES OF FOOD IN THE NORMAL AND IN SOME PATHOLOGICAL CONDITIONS OF THE CECUM AND RECTUM.

(Uk.) Gubkin, V. A. (Shevchenko U., Kiev, USSR). *Fiziol. Zh. (Kiev)* 13(3):338-343, 1967.

Study was on 2 dogs (10-11 kg wt.) with fistulas in the upper part of the jejunum and ileum and with small parts of these segments covered from the side of tunica serosa with fine lead shot, which was covered by a layer of Plexiglass. Study of the character of contractions and velocity of progress of the chyme in the jejunum and ileum during feeding (food of different consistency containing proteins, or carbohydrates, or fats) in normal dogs or those with proctitis (provoked by repeated admin. of 20-30 ml of 10% soln. $AgNO_3$ into rectum) and appendicitis (provoked by repeated admin. of 3-5 ml of 10% $AgNO_3$ soln. into cecum) showed that motility of the jejunum and, to some degree the ileum, depends basically on the physical, and to a significantly lower degree on the chemical characteristics of the food. Fats markedly changed the motility of the small intestine. The contraction amplitude of the small intestine was greater after food consumption in lumps and lower after feeding with ground or liquid food. After feeding with protein and carbohydrate food a biphasic character of nutritional motility was evident in the jejunum, while in the ileum the phases were poorly expressed. The first phase (starting immediately after feeding) is characterized by a greater motility in the jejunum than the second phase. The transit speed of chyme in small parts of the jejunum and ileum depended little on the type of food, but the total time of the progress of the content from the duodenum to ileum with various types of food is different. In the case of proctitis and appendicitis the dynamics and character of contraction were disturbed as well as the velocity and dynamics of chyme transit in the small intestine.

9845 RELEASE OF A BRADYKININ-LIKE SUBSTANCE ON NERVOUS STIMULATION OF A FROG STOMACH MUSCLE PREPARATION.

(E.) Singh, I. (Med. Coll., Agra, India). *Arch. Int. Physiol* 75(2):211-217, 1967.

The isolated and perfused stomach (with attach vagus nerve) of *Rana tigrana* was allowed to release polypeptides spontaneously into Tyrode a DeJalon soln., then the vagus was stimulated w rectangular pulses of 0.5 msec. at 10 volts at shocks/sec. for 1 hr. in order to study polypeptides released by the nerve. The soln. wer tested for polypeptides on guinea pig ileum, r bit small intestine, and rat duodenum. Stomac contraction was also studied by stimulating th vagus for 30 sec. with rectangular pulses of 0 msec. duration at 10 volts and 12 shocks/sec. Vagal stimulation released neurokinin (substan P) and a bradykinin-like substance, and produc 2 types of contraction, one of which could be abolished with acetylsalicylic acid. This suggested the polypeptide's role as transmitter. nature of the other type of contraction was unknown.

9846 PRESENCE AND RELEASE OF PROSTAGLANDI IN THE RAT STOMACH.

(It.) Coceani, (U. Bologna, Italy), C. Pace, F. Volta and L. Wolfe. *Boll. Soc. Ital. Biol. Sper.* 43(2):76- 1967.

Various experiments were performed to determin the presence and mode of release of prostaglan in the rat stomach. A substance with properti similar to those of the prostaglandins was isol from rat stomach perfusates obtained according to the Paton-Vane method and differed from othe biologically active substances in the followin acts on stomach preparations pretreated with atropine and methysergide (1×10^{-7} g/ml); is r destroyed by incubation with chymotrypsin (100 µg/ml) for 30 min. at pH of 8.5 and 37.5°C; is separated at pH of 2 in ethyl ether but not in petroleum ether boiling interval 30-60°C). Chromatography (Green-Samuelsson method) reveal that the prostaglandins present in the perfusat were mostly of the E type (especially E_2) with very small amounts of the F type ($F_{1\alpha}$ and $F_{2\alpha}$). Prostaglandins of identical chemical structure were also present in stomachs entirely removed. The amount of prostaglandins released *in vitro* amounted to 0.3 ng/min. (activity expressed in equivalents of prostaglandin E_1) and increased to 0.7 and 1.1 ng/min. after 5 counts/sec. and 10 counts/sec., resp., of vagus stimulation. T amount of prostaglandins liberated did not chan following stimulation of postganglionic sympath fibers. Experiments conducted on stomach prepa tions preserved in Tyrode's soln. for 3 days at 2-3°C, and consequently without nerve endings, revealed that prostaglandins were released at the level of the muscular layer and in the same amounts as in fresh stomach preparations at res Results indicate that prostaglandins as such or in the form of precursors or metabolites play a role in the regulation of gastric motility. Results also seem to indicate that the shifting o ons in the muscular layer is one of the major, ot the major, mechanism explaining the spasmo- : effect of the prostaglandins.

MECHANISM OF ACTION OF PENTAZOCINE ON GASTROINTESTINAL MOTOR FUNCTION. (E.)
of, I. E. (U. Texas Southwestern Med. Sch., as) and W. P. Blackmore. Toxic. Appl. nacol. 10(2):223-232, 1967.

izocine was admin. in doses of 0.5-3.0 mg/kg nesthetized and unanesthetized dogs, and was sociated with a change in the rate of slow- potentials in the pyloric antrum from the il 4-5 waves/min. A decrease in slow-wave gation velocity in the proximal pyloric an- was observed after the drug, leaving un- ged the propagation velocity in the distal of pyloric antrum. The pyloric sphincter apparently unaffected by pentazocine in the s utilized in these studies. Additionally, izocine was associated with a transient in- e in action potentials (spiking) and an in- e in amplitude of duodenal motility leaving fected the normal duodenal slow-wave rate of ox. 17-19/min. Immediately after this, spik- nd duodenal motility were abrogated and the enal tone was markedly diminished. Respiratory was diminished and the pattern showed ir- arities after pentazocine. It is suggested the interposition of a normal distal pyloric ent between the proximal pyloric antrum above the immobile and hypotonic duodenum below wed pressure gradients to develop which im- d the normal rate of gastric emptying.

COMPARISON OF THE EFFECTS OF A GASTRIN EXTRACT AND A SYNTHETIC PENTAPEPTIDE
ASTROINTESTINAL MOTILITY IN THE CAT. (E.)
/, J. (St. Bartholomew's Hosp., London).
3(3):242-248, 1967.

ne anesthetized cat whose anterior abdominal was replaced by a transparent window, the cts of gastrin and I.C.I. 50,123 [a synthetic apeptide] on the motility of the stomach, l intestine and colon were compared both be- and after sympathetic blockade and after renergic blockade, β-adrenergic blockade, and pine and mepyramine maleate admin. Gastro- stinal motility was evaluated both visually by means of a gastric balloon and fluid-filled s placed in the small intestine. Gastrin pro- d minimal motility in the stomach and motility onses of similar magnitude in the small in- ine and colon. The gastrin effect on the l intestine and colon was potentiated by α- β-adrenergic blockade, resp. Atropinization lted in no change in gastrin effect except r both α- and β-blockade. The motility ef- s of gastrin were unaffected by mepyramine n. I.C.I. 50,123 did not produce any effect otility in the small intestine. In the pinized cat, the motility effect of I.C.I. 23 on the colon was significantly reduced and negligible and no effect on stomach and small intestine motility was noted, resp. Motility effects of I.C.I. 50,123 on all areas were enhanced following admin. of atropine and following both α- and β-adrenergic blockade.

9849 GASTRIN AS AN INTESTINAL ACTIVATOR. (E.) Logan, C. J. H. (Queen's U., Belfast, N. Ireland). Brit. J. Surg. 54(4): 297-301, 1967.

In the described work, I.C.I. 50,123 (N-t-butyloxy-carbonyl-β-alanyl-l-tryptophyl-l-methionyl-l-aspartyl-l-phenylalanine amide, a pentapeptide with similar physiologic activity as gastrin) is used, employing pure gastrin to compare the effects of the 2 substances. The intraluminal pressure in the gut of mongrel dogs was measured by miniature balloons connected to a metal capsule optical manometer. Three balloons 5 cm apart were used in the colon while 1 was used in the Thiry fistula where the ileal motility was measured. A polythene cannula in a vein in the back leg of each dog was kept patent by an infusion of normal saline. During 3 min. i.v. inj. were given, and on 14 occasions a consant infusion of I.C.I. 50,123 was given, using an infusion pump. Six. inj. of Gastrin II were given to 3 dogs. With 0.25 μg/kg and 0.5 μg/kg there was increased activity in the colon and rectum of 1 dog whereas 0.5 μg/kg admin. twice to another dog had no effect. With 1.0 μg/kg given on 2 occasions there was increased activity in the rectum once and twice in the colon with 23 inj. of I.C.I. 50,123 given to 5 dogs, 1 of 4 inj. (0.125 μg/kg i.v.) increased colonic motility. Three of 4 inj. of 0.25 μg/kg increased motility in the colon and rectum. No obvious rise in activity was observed with increased dosage. Prolonged infusion of I.C.I. 50,123 (0.25 μg/kg.-2.0 μg/kg/min. given over 15-60 min.) caused increased motility in the colon and rectum, and slackening in intensity after 10 min. Dog meat (500 gm p.o.) showed a marked increase in colonic motility within 5 min. of food consumption. Five min. after i.v. inj. of pure gastrin (0.125-0.5 μg/kg) motility of ileal Thiry fistula was increased, decreasing in the second 5 min. after inj. of 0.25-0.5 μg/kg. I.C.I. 50,123 did not show an overall effect on the motility of ileal Thiry fistulae although prolonged infusion (0.5-1.5 μg/kg) caused increased motility.

9850 GASTROESOPHAGEAL SPHINCTERIC PRESSURES BEFORE AND AFTER ORAL ANTICHOLINERGIC DRUG AND PLACEBO ADMINISTRATION. (E.) Kelley, M. L., Jr. (U. Rochester Sch. Med., N. Y.) and H. L. Friedland. Amer. J. Dig. Dis. 12(8):823-833, 1967.

Resting pressures in each 0.5 cm segment of the gastroesophageal sphincter were measured in 24 presumably healthy persons (12 men, 12 women; 21-42 yr. old; mean age, 27.6 yr.) before and after 1 wk. p.o. admin. of valethamate bromide

(20 mg, 4 times a day), an anticholinergic with muscle-relaxing properties, or a placebo (which contained 80 mg of lactose) of identical appearance. The double-blind technic was used, with 12 subjects in each group. Pressures were detected by a 5- x 5-mm water-filled balloon and laterally notched, water-filled polyethylene tubes attached to extracorporeal transducers and measured at end inspiration and end expiration. No significant pressure alterations in either the open-tip or balloon tracings were recorded in subjects who ingested valethamate bromide. In those who received the placebo, a decrease in open-tip pressures was recorded in the infrahiatal segments, the change being most apparent at end inspiration. Pressures registered by the balloon in the placebo group were not similarly altered.

9851 REFLUX PANCREATOGRAPHY. AN EXPERIMENTAL STUDY IN MONKEYS. (E.) Doppman, J. (NIH, Bethesda, Md.) and R. H. Johnson. Invest. Radiol. 2(2):113-118, 1967.

Eleven of 13 Rhesus monkeys (Macaca mulatta) were subjected to the following surgical procedure: after a midline abdominal incision, umbilical tapes were placed about the duodenum at the pylorus and at the ligament of Treitz, isolating the ampulla of Vater within a closed duodenal loop; before ligation of the pyloric end, a urethral catheter was introduced through a gastrotomy incision and its tip positioned in the second duodenum; the abdomen was then closed and the urethral catheter brought out through the incision, allowing for inflation of the loop and monitoring of the intraduodenal pressure. The animals were then divided into 3 groups. In Group 1, the experimental group of 8 monkeys received secretin (20 clinical U) and cholecystokinin-pancreozymin (75 Ivy dog U of cholecystokinin and 300 Crick, Harper and Raper U of pancreozymin) intraduodenally over 2-3 min. The duodenal loop was inflated with Conray 60, and distention at 40 cm water was carefully maintained throughout the experiment. Reflux of contrast material into the pancreatic and biliary ducts occurred after secretin-cholecystokinin stimulation in 7 of 8 monkeys; reflux appeared at various times between 2 and 120 min. after duodenal distention; the pancreatic duct always filled first, and the process was a gradual retrograde opacification of the pancreatic duct over 1-2 min. All refluxing animals, except 1 (not evaluated) showed gross and microscopic evidence of pancreatitis; the most severe changes were found in animals with prolonged reflux and extensive alveolarization of the contrast material. Amylase levels postoperatively were elevated in all of the refluxing animals except 1. Group B consisted of 3 animals handled in an identical manner to th
of Group A, except that they did not receive secretin or cholecystokinin-pancreozymin; the duodenal segments of these animals were disten
arbitrarily for 3 hr. at 40 cm water. There wa
no reflux, the pancreas was normal and amylase levels at 1, 6 and 24 hr. postoperatively were also normal. Group C consisted of 2 animals w
were not operated upon, but who were given ide
tical doses of secretin and cholecystokinin-pa
creozymin; normal amylase levels were found in
these animals, and their pancreas was normal.
is concluded that reflux of duodenal contents
the pancreatic and biliary duct systems of mon
can be produced when intraduodenal pressure is
raised and the gastrointestinal hormones, secr
and cholecystokinin, are given. Whether reflu
is due to a direct relaxant action of cholecys
kinin upon the ductal sphincters or occurs dur
the periodic discharge of bile and pancreatic
secretion after hormonal stimulation is unknow

9852 THÈ ADRENOTROPIC RECEPTORS IN THE INTESTINE (ON THE MOTOR RESPONSE OF GUINEA PIG ILEUM). (E.) Ando, J. (Osaka Med. Coll., Japan) and K. Shiozu. Bull. Osaka Med. Sch. 13(1):1-3, 1967.

9853 EXTRACARDIAC EFFECT OF CYMARIN ON TH
SMOOTH MUSCLES OF THE INTESTINE. (G
Graebner, R. (DIWAG Pharm. Lab., Berlin) and K. Credner. Naunyn Schmiedeberg. Arch. Pharm. Exp. Path. 258(1):37-47, 1967.

9854 SPIKE PROPAGATION IN THE SMOOTH MUSC
OF THE GUINEA-PIG TAENIA COLI. (E.) Tomita, T. (U. Oxford, England). J. Physiol. (London) 191(3):517-527, 1967.

9855 EFFECT OF LIDOFLAZINE ON NOREPINEPHR
ANGIOTENSIN AND SEROTONIN RESPONSES
ISOLATED SMOOTH MUSCLE PREPARATIONS. (E.) Türker, R. K. (U. Ankara, Turkey) and S. O. Kayaalp. Experientia 23(8):647, 1967.

9856 THE INFLUENCE OF 1-METHYL-D-LYSERGIC ACID BUTANOLAMIDE ON GASTROINTESTINAL
SEROTONIN IN THE SPRAGUE-DAWLEY RAT. (E.) Thompson, J. H. (U. California, Los Angeles an
L. B. Campbell. Biochem. Pharmacol. 16(7):137
1380, 1967.

9857 SPREAD OF EXCITATION IN THE SMOOTH MUSCLE OF THE RAT PORTAL VEIN. (E.) Johansson, B. (U. Goteborg, Sweden) and B. Ljun
Acta Physiol. Scand. 70(3-4):312-322, 1967.

See also abstract nos.: 9723,10090,10148,10268

STRUCTURE OF REGENERATED LIVER FOLLOWING
RESECTION IN RATS OF DIFFERENT AGES.
Sidorova, B. F. (Inst. Exp. Biol., Acad.
i., Moscow). Biull. Eksp. Biol. Med. 63(1):
1967.

f rats (5-7/age group) after partial
tomy (66% of total organ wt. was removed)
age 7 and 14 days only slightly differed
at of intact rats (controls; 4-5/age group)
ifice 1.5 mo. after surgery. Most of the
lobes were the same size (e.g. Class 1 -
f 140-240 mm^2 surface; Class 2 - 260-360
ass 3 - 380-480 mm^2; Class 4 - 500-600 mm^2,
ers), e.g., Classes 1-4 predominated over
, as in controls Classes 1-3 predominated
ass 2. A greater number of Class 3 and 4
as compared to controls, showed that in
egeneration new hepatic lobes developed
y also became hypertrophic. In rats having
hepatectomy at the age 24-28 days and
ced 6 mo. later, the lobes were 2-3 times
than controls; they were mainly of Classes
compared to Classes 1-4 in controls. The
size of lobes in treated rats is conditioned
rgement in the process of liver growth.
her similar experiment (except both 10 and
old rats at surgery were sacrificed 1.5 mo.
the same results were obtained; e.g. in 24-
rats with hepatectomy, the lobes were
ophic as compared to controls, while in
th hepatectomy at the age 10 days, lobe
s similar to that in controls. Larger size
nd more in treated than in controls. Age
ecisive significance in the determination
structure of regenerated liver; structure
organ at the moment of surgery determines
ucture in the process of regeneration.

THE EFFECT OF DIET UPON THE BILIRUBINEMIA
OF THE GUNN RAT. TESTS WITH PERITONEAL
CHOLOSTASIS AND ALSO NOVOBIOCIN IN
TS. (Fr.) Housset, E. (Animal Biol.
h. Res. Unit, Paris), J. P. Etienne, J. P.
P. Oudéa, M. C. Oudéa and P. Manchon.
ol. (Paris) 15(9-10):457-469, 1967.

nn rats (150-400 g), in addition to
n determinations in blood and bile using
l and benzene extraction methods, total
olesterol was measured; alkaline phos-
and 5 nucleotidases were also determined.
ound that the more fat in the diet the
bilirubinemia. On a commercial diet
eral fat content for 7 days 30 rats av.
bilirubinemia; on a diet with 3% fat
ys bilirubinemia was 11.2 mg%; after a
o the fat-rich first diet bilirubinemia
mg%. Control fat-diet tests confirmed
lues. The nature of the fat and the
f saturation did not seem to matter.
of the bile duct and section of the
t with drainage into the peritoneal cavity
thyl-isothiocyanate admin. (100 mg/100 g
body wt.) introduced by gastric intubation, did not affect bilirubinemia of the Gunn rat. The enzyme changes were similar to those in the normal rat under the same experimental conditions. Ultramicroscopic changes were not different from those in the normal rat. Novobiocin i.v. inj. (4 mg/100 g body wt.) into the normal rat causes a sharp fall in the amount of bilirubin excreted in the bile but had no effect on bilirubin excretion in the Gunn rat.

9860 EARLY HISTOCHEMICAL CHANGES IN THE LIVER OF YOUNG RATS IN PROTEIN-CHOLINE INSUFFICIENCY. (Rus.) Gupalo, E. E. Inst. Ther., Moscow). Arkh. Pat. 29(3):53-58, 1967.

A total of 40 immature male rats were maintained on a choline-free low-protein diet for up to 30 days; on day 2 of the diet, they exhibited redistribution of enzyme activity from periportal zones of the hepatic lobe into its central portions in connection with the development of periportal adiposis. From the start of the diet and up to 30 days on the diet, synthesis of fats, fatty acids and phospholipids in liver cells was stimulated; this was accompanied by depression of all other enzymatic systems studied. Droplets of fat were observed after 1-2 days of the diet; their content increased and by day 30 the formation of fatty cysts was observed. Phospholipids, usually not found in the normal liver, appeared after 2 days, reached their max. by 6-8 days and decreased by day 30. Glycogen content gradually decreased from the second-sixth day, and its content varied in different zones; by the thirtieth day it was markedly decreased and uniform throughout the lobe. Activity of acid phosphatase after 2 days was higher in the central and middle part of the lobe, and lower on the periphery (at normal, the highest activity was found in this portion); by day 8 its activity was reduced and evenly distributed in the central and peripheral portions, and by the thirtieth day the amount of this enzyme was markedly decreased and diffusely spread in the lobe, with no even distribution of activity. Alkaline phosphatase was found in small amounts in the normal state, and by the second day had almost completely disappeared from the periportal zone and appeared in the region of the central vein and its endothelium; in the case of fatty cyst formation, it continued to accumulate, chiefly in the pericentral zones. Cytochrome oxidase was markedly decreased in the first days of the dietary regimen. Succinic dehydrogenase was redistributed, with subsequent gradual and uniform decrease of enzyme activity. After 2 days, the region of max. activity of nonspecific esterase decreased, but its content increased; subsequently the amount of this enzyme also decreased around the central veins.

9861 EFFECT OF ETHANOL ON HEPATIC METABOLISM OF SULFOBROMOPHTHALEIN. (E.)

Lieberman, A. H. (U. California Sch. Med., San Francisco) and A. W. Childs. Amer. J. Physiol. 213(2):353-357, 1967.

Hepatic uptake, storage, conjugation and excretion of BSP (2 mg/100 g; admin. i.v.) were determined in rats. Conjugated BSP in bile or extract of liver was identified by a method using paper chromatography. Ethanol, admin. i.p. in a dose of 120 mg/100 g, caused a decrease in the proportion of conjugated BSP in storage and in the rate of excretion of conjugated BSP in bile, but did not affect the rate of uptake, excretion of unconjugated BSP or the ability of the liver to excrete admin. BSP-glutathione mercaptide. It is concluded that ethanol decreases the rate of excretion of BSP by impairing conjugation with glutathione. Hepatic cellular mechanisms for uptake of dye from plasma and transfer of dye from cell to bile are independent of the mechanism for conjugation, and conjugation is a rate-determining step in the excretion of BSP.

9862 THE EFFECT OF PHENOBARBITAL ON HYPERBILIRUBINEMIA IN GLUCURONYL TRANSFERASE DEFICIENT RATS. (E.) DeLeon, A. (Albert Einstein Coll. Med., New York, N. Y.), L. M. Gartner and I. M. Arias. J. Lab. Clin. Med. 70(2):273-278, 1967.

Homozygous, glucuronyl-transferase-deficient rats (Gunn) were given daily s.c. inj. of sodium phenobarbital for 12 wk. in increasing dosages from 60-200 mg/kg. This treatment increased the ratio of liver wt./total body wt. and produced a 2.5-fold increase in side-chain oxidation of hexobarbital in vitro as well as an abundance of smooth endoplasmic reticulum, as observed cytochemically and by electron microscopy. Drug treatment did not reduce serum unconjugated bilirubin conc., increase serum direct-reacting bilirubin conc., result in the appearance of bilirubin glucuronide in the cannulated bile duct or increase hepatic glucuronyl transferase activity in vitro; however, daily admin. of 80 mg/kg of sodium phenobarbital for 14 days to normal Sprague-Dawley rats significantly increased hepatic glucuronyl transferase activity in vitro, with bilirubin as a glucuronide receptor. It is suggested that the Gunn rat is genetically incapable of forming bilirubin glucuronide, whereas some humans with jaundice of this type have a relative deficiency of glucuronyl transferase and may respond to phenobarbital. The response to phenobarbital may provide a means for studying the expressivity of this inherited defect.

9863 ESTIMATION OF HEPATIC IRON STORES BY IN VIVO MEASUREMENT OF MAGNETIC SUSCEPTIBILITY. (E.) Bauman, J. H. (Western Reserve U. Sch. Med., Cleveland, Ohio) and J. W. Harris. J. Lab. Clin. Med. 70(2):246-257, 1967.

The positive magnetic susceptibility of hemosiderin and ferritin, a property very unusual to biological materials, suggested that this characteristi
could be exploited for estimating hepatic st
Fe. Calculations indicated that each g of f
ritin-hemosiderin (storage Fe) would be expe
to increase the magnetic susceptibility of a
liver by approx. +0.08 x 10^{-6} electromagneti
U/cm^3. Using an instrument devised to make
in vivo and in vitro measurements of magneti
susceptibility, satisfactory agreement with
above predicted value was obtained by in vit
measurements of rabbit livers containing dif
ferent but known amounts of storage Fe. In
rats linear body scans of magnetic susceptib
were repeatedly made during progressive Fe l
ing, and proved capable of detecting hepatic
overload. The conc. of hepatic storage Fe t
could be detected by these means was signifi
less than the av. reported in livers of pati
with hemochromatosis. It is probable that h
Fe stores in the human can also be safely ev
by magnetic susceptibility measurements usir
similar, but suitably modified, externally a
sensing device.

9864 EFFECT OF BILE SALT AND SECRETIN
BILE FLOW FROM THE ISOLATED PERFU
PIG LIVER. (E.) Hardison, W. G. (Boston C
Hosp., Mass.) and J. C. Norman. Gastroente
53(3):412-417, 1967.

The effects of 2 choleretic agents, secreti
cholic acid, upon the isolated perfused pig
were studied; the actions of these substanc
upon the perfused liver were similar to the
known actions in vivo. Cholic acid caused
creased flow of bile rich in bile salt with
major changes in relative Cl and bicarbonat
secretin stimulated the flow of bile rich i
bicarbonate, but poor in Cl. The similarit
tween these effects and the known effects o
secretin and bile salts in vivo suggests th
perfused liver performs its function of bil
formation in a physiological manner (this i
portant when the use of the perfused pig li
support patients with hepatic failure is co
sidered). Since the perfused liver is isol
from endogenous regulators of bile flow, it
advantages over the intact bile fistula ani
as a preparation to study bile regulatory
mechanisms. In addition, since varying amo
of bile salts and possibly circulating secr
are presented to the pig liver during perfu
of patients with hepatic failure, bile flow
much of its usefulness as a quantitative me
of liver function during clinical perfusion

9865 STUDIES IN THE BIOSYNTHESIS OF HE
AND BILIARY LECITHINS. (E.) Bal
J. A. (Albany Med. Coll., N. Y.), D. A. Bee
D. H. Treble and H. L. Spitzer. J. Lipid R
8(5):486-493, 1967.

Male rats with biliary cannulae were inj. w
linoleate-1-^{14}C, stearate-1-^{14}C, palmitate-
L-methionine-methyl-^{14}C, phosphate-^{32}P and
methyl-^{3}H in various combinations and the i
corporation of these isotopes into the phos
lipids of plasma, liver and bile was determ

hr. Linoleoyl lecithin of liver attained
specific activity with respect to phos-
^{2}P and choline-methyl-^{3}H than did arachido-
cithin. Lecithin in bile attained higher
activities with respect to phosphate-^{32}P,
-methyl-^{3}H and linoleate-1-^{14}C than the
onding hepatic lecithins. Stearate-1-^{14}C
nitate-9-10-^{3}H attained highest specific
ies in the hepatic lecithin fraction rich
idonic acid. The specific activity of
phosphatidyl ethanolamine was lower with
to saturated fatty acids, but much higher
spect to ^{32}P than any lecithin. The ratio
fic activity of ^{3}H in methyl groups from
to ^{14}C in methyl groups from methionine
ic sphingomyelin was lower than in hepatic
l lecithin. These results favor the
is that 1) exchange of saturated fatty
ays a role in the formation of lecithins;
the unsaturated fatty acids do not undergo
ant exchange and determine the pathway of
esis of lecithins; and 3) that there is
ore than 1 pool of cytidine 5'-diphosphate-
in liver or a pathway of biosynthesis of
from choline not involving cytidine
sphate-choline as an intermediate.

ELECTRON MICROSCOPIC AND BIOCHEMICAL
STUDY OF LIPOPROTEIN SYNTHESIS IN THE
PERFUSED RAT LIVER. (E.) Jones, A. L.
Med. Sch., Boston, Mass.), N. B. Ruderman
. Herrera. J. Lipid Res. 8(5):429-446,

ated perfused rat liver was used to study
800 A electron-opaque bodies which had
ly been described in the liver cell Golgi
s, smooth endoplasmic reticulum and space
When the perfusion medium was enriched
oleate, the number and electron opacity
particles increased markedly. Sequential
showed that they appeared first in the
urfaced terminal ends of the rough retic-
e smooth endoplasmic reticulum proper, and
i apparatus and later in the space of
After 60 min. of perfusion, particles of
size and shape as those in the liver
uld be isolated in large numbers from
less than 1.006 fraction of the perfusate.
livers perfused with an identical medium
out linoleate did not show these changes.
markedly depressed the production of
Å particles by livers perfused with an
ich medium; however, it did not interfere
formation of large cytoplasmic droplets
al fat. In keeping with these findings,
blocked the incorporation of oleate-^{14}C
oprotein triglyceride isolated from the
e, but did not interfere with the appear-
the labeled fatty acid in tissue tri-
e. Puromycin also blocked incorporation
ne-^{3}H into both tissue protein and per-
ipoprotein. It is concluded that the
Å particles observed were, probably,
density lipoproteins and that their
is blocked by puromycin, presumably
through interference with the synthesis of their apoprotein.

9867 BILIRUBIN GLUCURONIDE FORMATION IN DEVELOPING GUINEA PIG LIVER. (E.) Flodgaard, H. J. (U. Copenhagen, Denmark) and R. Brodersen. Scand. J. Clin. Lab. Invest. 19(2): 149-155, 1967.

The formation of bilirubin diglucuronide by guinea pig liver tissue slices and microsomes was studied, using a radioisotope derivative method for the quantitative determinations, at various stages of perinatal development. Incubation of bilirubin with microsomes was performed in 2 ml vol. containing 14 mM $NaHCO_3$, 62 mM NaCl, 0.6 mM KH_2PO_4, 10 mM glucose (phosphate-bicarbonate soln.), bovine albumin, 30 g/liter, uridine-5-diphosphate glucuronic acid ammonium salt and bilirubin. o-Aminophenol was incubated in the same medium as was used for bilirubin. o-Aminophenol inhibited the conjugation of bilirubin competitively and *vice versa*; from the K_m and K_i values, it was concluded that bilirubin and o-aminophenol are conjugated by 2 different enzymes. The liver slices rapidly lost uridine-5-diphosphate glucuronic acid to the medium, and the rate of bilirubin conjugation decreased; from the course of these processes, an approximate value of the K_m for uridine-5-phosphate glucuronic acid was calculated. Uridine-5-diphosphate glucuronic acid conc. in the guinea pig liver was found to increase approx. 20-fold during development from 1 mo. before birth to 4-5 days of age, when adult values were reached. The possible role of the low uridine-5-diphosphate glucuronic acid content of the liver of the fetus and newborn in the pathogenesis of neonatal jaundice is discussed.

9868 ISOLATED DOUBLE PERFUSION OF THE LIVER IN THE STUDY OF THE RETICULO-ENDOTHELIAL SYSTEM. (E.) Jeunet, F. S. (U. Minnesota, Minneapolis), W. J. Shoemaker and R. A. Good. Nature (London) 215(5096):61-62, 1967.

A single perfusion apparatus was modified so that a single isolated liver could have its entire perfusate changed without interrupting circulation through the liver, thereby forming a double perfusion apparatus. The liver was isolated from a Sprague-Dawley rat and perfused with a soln. which was a mixture of total fresh blood taken from rats of the same strain and heparinized (500 U/ml) with Tyrode soln. (pH 7.4-7.6) in the ratio of 3:1; 20 mg chlortetracycline and 800 mg of dextrose was added, and total vol. of the perfusate was 100 ml. Flow through the liver was kept constant at 15 ± 1 ml/min. Radioactive "Aurcoloid" containing ^{198}Au was used to measure the speed of clearance by the liver. When 2.5 mg "Aurcoloid" was added 3 min. after beginning perfusion, 50% of the Au was cleared from the perfusate 10 min. later; the same dose was added at 40 min.; 50% clearance took 14 min., and after the third dose, time required for 50% clearance was 23 min. When the entire perfusate was changed at 155 min., using rat blood fresh to the liver, and another similar dose of "Aurcoloid" added, the time required to clear 50% of the circulating Au was again short, 8 min.; after another dose it was only 14 min., and after a third, 21 min. Diminution of the rate of clearance of Au was increased simply by changing the perfusate for fresh, previously unperfused, rat blood. These findings indicated that rat serum contains a factor that may be exhausted by the initial repeated perfusion of Au, and that the factor was renewed by addition of fresh rat blood to the perfusing system. It is suggested that the decreasing rate of clearance observed initially was due to exhaustion of the serum factor and not to functional blockade of the reticulo-endothelial cells or to a shift in site of phagocytosis. Careful monitoring of the outflow of blood and controlled circulation allowed specific exclusion of outflow circulation block as a basis for decrease in function. Also, variation of the timing of the point of admin. of the colloidal Au after beginning of perfusion indicated clearly that the circulating factor was not being used non-specifically or metabolized by the liver. It is thought that use of this double perfusion system should be valuable in obtaining critical analysis of reticulo-endothelial function in the absence of many factors difficult to control in the intact animal.

9869 UPTAKE OF CHYLOMICRON LIPID BY RAT LIVER PARENCHYMAL CELLS IN VIVO. (E.)

Higgins, J. A. (U. Liverpool, England) and C. Green. Nature (London) 215(5096):83, 1967.

Chylomicrons were obtained after admin. of glycerol tri(1-^{14}C) palmitate to rats in which thoracic duct cannulae had been established; the only heparin used was a small amount in the saline filling the cannula when it was inserted. The washed chylomicrons (0.75-2.05 mg of lipid) were inj. into the exposed femoral vein of fed rats over a 30-sec. period; 1 min. after inj. was completed, the liver was perfused with ice-cold, Ca-free Locke's soln. containing 0.27 M sodium citrate, and homogenized in Hanks soln. The homogenate was filtered through nylon mesh (60 µ pore size) and the filtrate centrifuged at 1300 g for 1 min.; the sedimented parenchymal cells were washed and the total lipid extracted for determination of ^{14}C distribution. Most of the ^{14}C-palmitic acid associated with the hepatic parenchymal cell was found in the triglyceride (73.1 ± 2.4% after chylomicron inj., compared to 93.1% in original chylomicrons), and much smaller amounts were found in phospholipids (19.2 ± 3.0% after chylomicron inj., compared to 6.8% of original chylomicrons). When tritiated palmitic acid was inj. as a complex with albumin, 57.8% of the radioactivity was in the phospholipids and 27.8% in the triglyceride. If chylomicron triglyceride had been hydrolyzed to nonesterified fatty acids before uptake by the liver cells, the distribution of radioactivity should have
been similar in the 2 experiments. Since th
are so different, these results establish th
under normal physiological conditions, chylo
triglycerides are directly removed from the
culation by the liver cells.

9870 DETOXIFICATION OF ENDOTOXIN BY PE
OF LIVER AND SPLEEN. (E.) Rutenl

(Harvard Med. Sch., Boston, Mass.), R. Skar
C. Palmerio and J. Fine. Proc. Soc. Exp. B
Med. 125(2):455-459, 1967.

The mortality of a dose of bacterial endoto
in rabbits, which was 85% when inj. into a
systemic vein, was reduced to 11% when it w
inj. through a mesenteric vein; this indica
that it must traverse the liver before ente
the systemic circulation. Bacterial endoto
(Salmonella enteritidis MLD/80 = 1 mg/kg) i
plasma was perfused through the denervated
spleen in vitro; corresponding dilutions of
fusate and effluent were assayed for detoxi
in pertussis-treated mice, and by the immun
fusion technic. These assays showed substa
detoxification of the endotoxin in the effl
and of the endotoxin retained by the spleen
Since the degree of dilution of the effluen
have been great enough to reduce the endoto
content/aliquot below the sensitivity of th
bioassay technics, partially purified extra
of spleen were also interacted with endotox
detoxification by the same assay technics w
demonstrated. These results showed that th
and spleen not only rapidly extract, but al
rapidly detoxify, bacterial endotoxins. Be
of varying degrees of vasoconstriction of t
circulation to these organs in the normal a
the full detoxifying potential of these org
when challenged may not be available.

9871 ROLE OF THE LIVER IN METABOLISM O
DL-NOREPINEPHRINE-^{14}C. (E.) Haz

C. G. (Mayo Clin., Rochester, Minn.), R. P.
E. V. Flock, S. G. Sheps, A. Schirger and C
Owen, Jr. Amer. J. Physiol. 212(6):1229-12
1967.

When whole blood from male Sprague-Dawley r
was incubated with DL-norepinephrine-7-^{14}C
acetate, 2 µg/100 ml, at 37°C, the mean upt
of ^{14}C into RBC was 32.0% at 15 min., 54.2%
1 hr. and 60.5% at 2 hr. and thereafter, wi
of the remainder being bound to plasma prot
nonselectively, from which it could be remo
readily by alumina at pH 8.4. Following in
6.1-9.8 µg of the compound into the tail ve
intact rats weighing 250-300 g, 74.5% of th
was excreted in the urine within 5 hr. Dur
the first hr., approx. 20% of the total was
creted as unchanged norepinephrine; 33% as
3-methoxy-4-hydroxyphenylglycol sulfate. S
amounts of normetanephrine, 3-methoxy-4-hyd
phenylglycol, 3,4-dihydroxymandelic acid, n
epinephrine glucuronide and normetanephrine
glucuronide were also excreted during the f

During the 4 hr. following, large amounts of
ary ^{14}C were found in normetanephrine gluc-
ide and 3-methoxy-4-hydroxyphenylglycol sul-
; smaller amounts in unchanged norepinephrine
ree normetanephrine. In rats bearing biliary
ulas, 5-hr. urinary excretion of ^{14}C was 71.5%
66.5%, resp., following inj. into the tail
or portal vein, while 5-hr. biliary excretion
10.7% and 22.3%, resp. In both cases, approx.
of the biliary ^{14}C was found in 3-methoxy-4-
oxyphenylglycol sulfate; approx. 40% in
etanephrine glucuronide. In hepatectomized
receiving 4.1-6.5 μg, as above, 5-hr. urinary
etion of ^{14}C was reduced to 32.3% and the
t was poorly tolerated. Radioactive compounds
he urine were distributed as in intact animals.
radioactive bile was collected and infused
the duodenum of intact rats, 11.2% of the
oactivity was excreted in the urine in 5 hr.;
%, in 48 hr. Fecal excretion totaled 22.4%.
isolated rat liver was perfused with blood
aining 0.05-4.0 μg/100 ml, the liver rapidly
red most of the norepinephrine in the plasma
approx. half that contained in the RBC, form-
large amounts of 3-methoxy-4-hydroxyphenyl-
ol sulfate and normetanephrine glucuronide,
were excreted in bile and also added to the
ulating blood, the 2 compounds being maintained
ne same ratio to each other, in both bile and
ulating blood, as that which was found in the
of animals bearing biliary fistulas: e.g.,
resp. Only 7-10% of the total dose of
oactivity was found in hepatic tissues after
of perfusion. Free and conjugated nor-
nephrine accounted for more than 66% of this
ue radioactivity; free and conjugated 3-methoxy-
droxyphenylglycol, for less than 33%. It is
luded that the rat liver plays a major role
nactivating and metabolizing circulating
orepinephrine and excretes only conjugated
bolites into the bile and peripheral circula-
although other tissues, working at a slower
release both free and conjugated metabolites.

SOME METHODICAL REMARKS TO ROUTINE
DETERMINATION OF LIVER DETOXICATING
ION WITH THE HELP OF THE METABOLISM OF
OBENZOIC-^{131}I ACID. (Cz.) Eysselt, M.
yne U., Brno, Czechoslovakia), J. Dohnálek
. Polášková. Vnitrni Lek. 13(1):77-84, 1967.

nts who did not receive food and water for
. preceding the test urinated to empty their
ers and received p.o. 20-25 μc (about 2 mg)
e Na salt of o-iodobenzoic-^{131}I and in 20 ml
0. Subsequently they were allowed to drink
of H_2O/kg wt. but during the next 2 hr. they
not allowed to drink or eat. Thereafter
irst urine samples were collected and the
nts were allowed to drink and eat. The
d and third urine samples were collected 4
hr. after admin. of o-iodobenzoic-^{131}I acid,
If necessary, the urine samples were
fied by acetic acid and all but 1 ml of each
e was used for determination of radioactivity.
ing the radioactivity of the samples against
the time of their collection made it possible to determine the half-life of o-idobenzoic-^{131}I acid excretion. The 1 ml samples of urine were used for analysis of the metabolic products of o-iodobenzoic-^{131}I acid. They were separated by paper electrophoresis in 0.1 M acetate buffer pH 5.5 (Whatman No. 1 paper; 200 volts, separation time 1.45-2.0 hr.; all compounds migrated to the anode) and identified by comparison of their mobility with those of standard labeled compounds applied to the same strip of paper. The individual spots on the dried electrophoretogram were located by scanning for radioactivity, were cut out and their radioactivity determined. Thus, the proportion of o-iodobenzoic-^{131}I acid to its various metabolic products (o-iodohippuric acid, o-iodobenzoylglucuronic acid, and a third unidentified compound) could be estimated.

9873 CONTROL OF LIVER CELL REPLICATION BY ALBUMIN NEED. (E.) Sudweeks, A. D. (U. Colorado Sch. Med., Denver) and R. B. Hill, Jr. J. Cell Biol. 34(1):404-406, 1967.

Adult female white rats were divided into experimental and control groups; in both, a third of the calculated circulating blood vol., calculated as 50 ml/kg, was removed. In controls, the whole blood was returned immediately; in the experimental group, it was replaced immediately with an equal vol. of fresh RBC suspended in saline with 10% glucose at a hematocrit equal to that of whole blood. Tritiated thymidine (1 μc/g) was admin. i.p. to each rat at 16, 19 and 22 hr. after plasmapheresis. Samples from all 4 major lobes of the liver of each rat were sectioned and radioautographed, as well as a section from each rat kidney. Each animal had a considerable decrease in circulating albumin as a result of plasmapheresis. In control animals, labeling of nuclei was slightly increased over baseline values, whereas in the livers of experimental animals, the labeled nuclei were increased several-fold. Labeled nuclei were uncommon in kidney, and no increase in labeled nuclei was observed in kidney after plasmapheresis. It is suggested that the rate of production of differentiated products of the liver, e.g., albumin, is controlled largely by the number of synthesizing cells, and that in order to increase markedly the hepatic synthesis of albumin, DNA synthesis and cell division must first occur. In addition, an hypothesis is proposed that distribution of functions among hepatocytes may be partially controlled during DNA synthesis or mitosis.

9874 THE PROBLEMS OF CIRCADIAN RHYTHM OF MITOTIC DIVISION OF LIVER CELLS IN ADULT RATS. (Cz.) Magrot, T. (Charles U., Plzen, Czechoslovakia) and F. Fakan. Plzensky Lek. Sborn. 27:41-52, 1966.

Changes in the mitotic index, in the content of DNA and RNA, and in the level of succinic dehydrogenase occurring within 1 day in rat liver tissue were determined as were the levels of blood glucose. Male Wistar rats (44) were fed 4 wk. before and during the experiment only once a day (between 6 and 7 p.m.) with Larsen's diet. Groups of 5-6 rats were killed in 3-hr. intervals and their livers and blood collected. The highest number of mitoses was observed in liver tissue harvested at 1 p.m. (4.2/6000 hepatocytes) and the lowest at 10 p.m. (0.16). However, the differences between various groups were statistically insignificant. The curve characterizing the variation in the DNA content of the liver tissue showed a sharp peak at 7 a.m. and a minimum between 7 p.m. and 1 a.m.; the differences (about 1.5 fold) between these groups were statistically significant. This was paralleled by a similar variation in the RNA content, although the peak observed at 7 a.m. was not as pronounced as with DNA. No correlation was found between the nucleic acid content and the mitotic index of liver tissue of individual animals. The highest level of succinic dehydrogenase in the liver was found at 7 p.m., e.g. immediately after feeding; thereafter, the level of the enzymes gradually decreased reaching a minimum (about 33% of the max. value) at 10 a.m. A correlation was found between the variation of the DNA content and that of succinic dehydrogenase. The higher the DNA conc., the lower was the level of the enzyme. The conc. of glucose in the blood varied between 90-140 mg%. The differences between the blood samples collected at various times were statistically insignificant.

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The activity of tyrosine transaminase in the rat liver varies each day over a fourfold range. Such activity is lowest at the start of the light period, rises sharply for 6 hr. beginning several hr. before the onset of darkness, after which it again declines, reaching its lowest level. This rhythm shows a remarkable degree of synchrony in animals kept under comparable environmental conditions. In intact rats the phase relationships of the tyrosine transaminase rhythm appear to be related to the adrenocortical rhythm although hypophysectomized rats still exhibit the basic rhythm as do animals actually deprived of the adrenal gland. This phenomenon suggests the possibility that the 24-hr. cycle in the ingestion of food could produce the rhythm, as could cyclic alterations of pineal function. It is also possible that the rhythm is intrinsic to the hepatic cells themselves. Sprague-Dawley female rats (100-200 g wt.) were subjected to a light-dark cycle. Some animals were kept intact, others were hypophysectomized or adrenalectomized. All rats were exposed to 50-70 ft-candle lighting (lights on for 12 hr. daily, starting at 6, 7 or 8 a.m.) in clear plastic cages for 7-10 days. Food and water were provided at liberty. The activity of tyrosine transaminase varied markedly during each 24-hr. period. Soon after the onse of darkness, enzyme activity was 4 times greate than during the early period of exposure to lig The rhythm persisted even after hypophysectomy or bilateral adrenalectomy, but appeared to be entrained by the adrenocortical secretory cycle in the intact animal.

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9935 BOWEL ANASTOMOSIS BY INVERTING AND EVERTING TECHNIQUES. AN EXPERIMENTAL STUDY. (E.) Healey, J. E., Jr. (U. Texas, Austin), C. M. Mc Bride and H. S. Gallager. J. Surg. Res. 7(7):299-304, 1967.

Whether coapting the peritoneal layer of the bowel (serosa to serosa), as compared to other methods of intestinal repair, gives the best intestinal healing was investigated. Adult mongrel dogs were fasted for 24 hr., given an enema, and were divided into 4 groups roughly equal in size prior to surgery. At surgery each of the groups received a different type of intestinal closing: inversion, submucosal apposition, eversion (sutured), and eversion (nonsutured). A group of small and large intestinal anastomoses was used as a control. Postoperatively, penicillin (200,000 U) and streptomycin (1 g) were admin. daily for 5 days. Primary healing was seen in all groups and the reaction was histologically similar whether the anastomosis was by inversion, submucosal apposition or by the eversion technics. In those animals in which the intestinal anastomoses were everted, the mortality was markedly low, probably because the intestinal lumen is not narrowed at the anastomotic site (as it is with coapting the peritoneal layer). The results of the present study indicate the Halsted's principle of including the submucosal layer, the strongest layer of the intestinal wall, in the intestinal closure is more practical in facilitation of intestinal healing than is Lembert's recommendation of serosa-to-serosa approximation.

9936 DOUBLE AND TRIPLE CONTRAST TECHNICS IN EXAMINATION OF THE UPPER GASTROINTESTINAL TRACT IN PROBLEM CASES. (E.) Buonocore, E. (U. Tennessee Mem. Res. Ctr. Hosp., Knoxville) and C. H. Brown. Amer. J. Dig. Dis. 12(9):867-877, 1967.

A total of 52 patients with suggestive but inconclusive abnormalities on standard X-ray examinations and/or clinical suspicion of gastrointestinal disease were examined using Ba spray; pneumoperitoneum was induced in 19 of these patients. Double- and triple-contrast views of the gastrointestinal mucosa and gastric wall were produced. Evaluation of distensibility and measurement of gastric-wall thickness improved the diagnostic accuracy in these patients. In all, 32 patients were considered normal in spite of suspicious clinical or roentgenographic findings; in 1 patient, a gastric ulcer escaped detection. In 19 patients the Ba spray technic with pneumoperitoneum confirmed abnormalities suggested, but not conclusively shown, on routine Ba-swallow studies; pathologic conditions found were gastric carcinomas in 7 (infiltrative in 6 and polypoid in 1), tumor infiltration of the medial segment of the gastric fundus from a carcinoma of the pancreas in 1, gastric and esophageal varices in 7, gastritis in 2 and benign gastric ulcer in 2. In 17 of these patients, the diagnosis was confirmed by surgery; in the remaining 2 patients, gastric ulcers wer diagnosed, and although the diagnoses were not surgically proved, the subsequent clinical courses tended to confirm the diagnosis. Tripl contrast views of the gastric wall revealed infiltrating malignancies from primary and metastatic tumors that were not appreciated by standard X-ray studies.

9937 FIELD TRIALS OF THIABENDAZOLE AS AN OVICIDE IN THE CONTROL OF HELMINTH INFECTIONS. III. EPIDEMIOLOGICAL ANALYSIS OF THE EFFECTIVENESS IN THE CONTROL OF Ascaris INFECTION. (Jap.) Kutsumi, H. (Nat. Inst. Health, Tokyo), T. Hara and K. Yamamoto. Nippo Kiseichu Gakkai (Jap. J. Parasit.) 16(1):15-27,

The effect of thiabendazole on Ascaris infectio in a village was studied, according to the rate of new infection among inhabitants in treated and nontreated areas. The ovicide was applied once a mo. at a conc. of approx. 10 parts per million; stool examination was performed on inhabitants every 4 mo. Mass treatment with anthelminthics was carried out in the treated area A (246 inhabitants) and nontreated (329 inhabitants) areas; no mass treatment with anthelminthics was carried out in treated area (157 inhabitants), in order to examine the sole effectiveness of nightsoil treatment. The incidence rates of ascaris infection in the initial and final examinations were 19.9% and 11.0%, resp., in the treated A area; 33.1% and 21.0% in the treated area B; and 14.9% and 11.6 in the non-treated areas. The rate of newly-infected cases was 22.0% and 23.5% in the treat A and B areas, resp. In the nontreated area, however, the rate of newly-infected cases was 21.6%, even in such a low incidence rate as 14.9%. In the nontreated area, fertilized ascaris eggs were observed in 48.8% (20 of 41) the newly-infected cases; in contrast, fertiliz eggs were observed in 10.7% (3 of 28) and 11.1% (2 of 18) of the newly-infected cases in the treated A and B areas, resp. The difference of the rate between the treated and non-treated areas was significant. In treated areas A and B, the increase in number of eggs in feces was noted in 4.8% (1 of 21) and 6.4% (2 of 31), res of the individuals. In the nontreated area, th increase was in 25.8% (8 of 31); this was significantly higher than that in the treated areas. The number of families from which more than 2 newly-infected cases appeared was 5 (19 newly-infected cases) in the nontreated area. However, in both treated areas the number of families mentioned above was low, being 1 (4 cases) in the treated area A and 1 (3 cases) in the treated area B. It is significant that the preventive effect observed in the treated B are in which no anthelminthics was used, was approx the same as that in treated area A.

38 A NEW MODIFICATION OF THE FLUORESCEIN STRING TEST FOR RAPID LOCALIZATION OF
PER GASTROINTESTINAL BLEEDINGS. (E.)
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is modified method involves the use of a thin
rforated polyvinyl plastic stomach tube
30 cm long) with a cotton tape and a radiopaque
lament inside. No Hg wt. is employed. After
istening the tube with water, the tube is
aced in the patient's stomach by pushing the
be through the nose and down the esophagus. In
e stomach, the tube is roentgenographically
cated and controlled. The tube is allowed to
ss to the ligament of Treitz. Fluorescein is
en inj. and the tube is removed after 5-10 min.
r purposes of identifying gross blood and
uorescence under UV light. The test takes
prox. 1 hr. and does not depend on the patient's
pacity to swallow. The modification is as
liable as the older, slower method in diagnos-
g cases of profuse, diffuse bleeding and in
ses of gastric bleeding with a negative radio-
gic picture. In patients who manifest a
scontinuous pattern of bleeding from the upper
strointestinal tract, but who have a distinct
eeding site, this modification may result in
me instances of false negative results.

39 PERITONEAL HYPOTHERMIA: PHYSIOLOGY AND INDICATIONS. (E.) Little, J. M.
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e results of experimental and clinical studies
peritoneal hypothermia are described. The
lanchnic area is an effective heat-exchanger
r the induction of moderate whole-body hypo-
ermia; irrigation of the splanchnic area with
ysiological soln. (isotonic saline or Ringer's
oln.) at 1-4°C produces esophageal temperatures
approx. 30°C in about 45 min. in man. A
mperature gradient develops between the
sophageal core temperature (which closely
arallels aortic temperature) and hepatic
emperature, and hepatic temperatures of 30-32°C
re reached within 20 min., allowing extended
ontrol of hepatic vascular inflow. In external
ooling, no such gradient is produced and the
epatic temperature closely follows the esopha-
eal temperature. Hepatic vascular inflow in
ogs varies with esophageal temperature, as does
ardiac output, and is not clearly related to
epatic temperature. The relation to esophageal
emperature is linear within the temperature range
o 30°C. This type of cooling is chiefly
pplicable to the unprepared patient, in whom an
ndication for hypothermia is found at laparotomy.
hile peritoneal hypothermia is not recommended
or routine use, its safety and efficacy have
een established.

40 ROENTGENOGRAPHIC EVALUATION OF EXPERIMENTAL INTRAPERITONEAL ABSCESS. (E.)
Deysine, M. (Cornell U. Med. Coll., New York, N. Y.), D. Alonso, R. Robinson and F. J. Veith. Arch. Surg. (Chicago) 95(2):220-223, 1967.

A method to produce circumscribed i.p. abscesses in the rat with low morbidity and mortality is described. A total of 50 g of fresh rat feces were mixed with 10 g of $BaSO_4$ powder and 10 ml of isotonic saline; this was placed into gelatin capsules. Control capsules were filled with a mixture of equal parts of $BaSO_4$ and isotonic saline. Capsules (control or experimental) were inserted into the abdominal cavity of male Sprague-Dawley rats by a midline laparotomy in the pelvis. Experimental and control groups consisted of 25 animals each. Roentgenograms of representative animals from each group were taken every 2 days, and a representative animal from each group was sacrificed every 2 days, and its abdomen studied grossly and microscopically. Four of 25 rats in the experimental group died within 36 hr. of operation; autopsy of these showed a disseminated suppurative peritonitis. All control animals survived the procedure and no animals died after the first 36 hr. X-ray examination of experimental animals after 2 days revealed a radiopaque mass surrounded by intestinal loops in the area of capsule insertion; subsequent films revealed development of a radiopaque shell in the area of the abscess wall. This surrounded a lucent area which represented the abscess cavity and purulent exudate. X-rays of controls showed a small pellet of Ba which did not change in shape during subsequent serial examination. This method should be of value in studies of new diagnostic methods for i.p. sepsis. The incorporation of $BaSO_4$ in material inducing abscess allows for radiological visualization of the development and evolution of the abscess wall and can be evaluated periodically without laparotomy.

9941 EVALUATION OF RELIABILITY OF SPLENOPORTOGRAPHIC EVIDENCES OF INOPERABILITY IN PATIENTS WITH TUMORS OF THE EPIGASTRIC REGION. (Rus.) Plotkin, V. I. (Novokuznetsk Inst. Postgrad. Med., USSR) and A. D. Sevast'ianova. Vestn. Khir. Grekov 98(4):70-75, 1967.

In 39 patients splenographic data were compared to findings at surgery. Calculations were made by the method of E. V. Gubler *et al*. wherein each of 8 symptoms found in the splenoportograms were weighted at values between -30 and 100 U; the highest sum of symptom values in the operable group was +25 and in the inoperable group, -5 to +200. In the inoperable group a sum of values near the range of operable patients (up to +25) was found in 9 (32%). The range of operability is equal to triple the amount of the highest sum of values in operable patients, -75 U. This amount approx. correlates to the sum of triple the root mean-square deviation and mean deviation of symptoms in the variable number of operable patients. At high determination of operability ranges in 50-60% of the patients by quantiative analyses of splenoportographic symptoms it is possible to determine operability ranges with sufficient accuracy. To evaluate each symptom it is necessary to consider the character of the process and its localization. In the malignant process if the phlebogram showed vascular amputation (-30 U), especially in combination with collateral circulation, surgery is not indicated. If the character of the process is obscure or benign, surgery should be undertaken. Determination of a filling defect, of decrease in contrast of vascular parts, especially in combination with other signs, could be contraindicative for surgery. A change in the portal vein, independent of primary tumor location, indicated impossibility of radical surgery. Radical surgery is possible in the presence of a filling defect or slight stenosis of the lineal vein and tumor location in the gastric cardia or in the region of the pancreatic tail. With the primary tumor location in the antrum or pancreatic head these changes indicate tumor spread beyond regional lymphatic nodes and surgery is contraindicated. Three case histories are given in detail.

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9990 PREVENTION OF EXPERIMENTAL PERITO ADHESIONS BY LOW MOLECULAR DEXTRA AN EXPERIMENTAL STUDY. (E.) Kapur, B. M. (All-India Inst. Med. Sci., New Delhi, Indi P. C. Rai and S. M. Gulati. Int. Surg. 48(264-269, 1967.

See also abstract nos.: 10273,10274,10449

GASTROINTESTINAL DISEASES

GENERAL

A STUDY OF ANTITOXIC IMMUNITY IN
CHILDREN SUFFERING FROM COLIENTERITIS.
) Speranskii, N. P. (Leningrad Sci. Res.
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11(9):30-34, 1966.

olihemolysin content in blood sera was studied
3 children (age 0- more than 2 yr.) with dif-
t forms of colienteritis (mild form in 118,
ately severe in 59, severe in 46), e.g.,
0111 (144 children) and Strain 026 (79 chil-
. Eighty-three children (age 6 mo.- more
2 yr.) who were carriers of enteropathogenic
richia coli 0111 (44) and serotype 026 (39)
studied. Healthy persons (33 newborns, 36
ren; 0- more than 2 yr., and 33 mothers)
d as controls. In the newborn controls anti-
emolysin was absent; in the children its
nce was determined in 63.6%, usually in titers
-1/80); in adults anticolihemolysin was found
.7% and its titer was higher than in chil-
At the beginning of disease anticoli-
ysin was present in 54 of 118 children with
form (1/20-1/160 titer), in 13 of 59 with
ately severe form (1/20-1/80), in 4 of 46
severe form (1/40-1/80) and in 52 of 83 car-
from the moment of hospitalization (1/20-
). The presence of anticolihemolysin in the
seems to protect children from colienteritis
nditions its more mild course; e.g. 26 chil-
with anticolihemolysin present in the blood
ter 1/80-1/160 showed no pronounced clinical
re or new infection with E. coli, while 20
ren with anticolihemolysin in low titers or
ut anticolihemolysin in the blood, the
cal picture was more pronounced or new in-
on occurred. An increase in anticolihemolysin
nt in the blood was found in 22 of 106 chil-
with the mild form of disease (1/40-1/160),
of 49 with moderately severe form (1/80-
), in 30 of 39 with severe form (1/80-1/1280)
n 7 of 76 carriers (1/40-1/80). An increase
ticolihemolysin was somewhat more often
with colienteritis type 0111 than type 026.
. accumulation of anticolihemolysin found
een the third to fourth wk. prior to the
t of disease was found in 80% of children.

STUDY OF INTESTINAL CONTENTS FOLLOWING
BILIOPANCREATIC STIMULATION WITH TEST
IN PATIENTS SUBJECTED TO SINGLE IRRADIATION
HE EPIGASTRIUM. (It.) Dalla Palma, L. (U.
ence, Italy), M. Cappellini, L. Taddei and
ecciolini. Nunt. Radiol. 32(9):855-881, 1967.

ttempt to clarify the pathogenesis of acute
y sickness, the effects of a single irradia-
of the epigastrium on duodenal contents and
opancreatic secretion were studied in 8 pa-
ts. Duodenal contents were collected im-
ately following admin. of test meal (2.5 g
olyethyleneglycol) and at 10-min. intervals
ng the first hr. and 15-min. intervals during
second hr. on the day before and on the day
of irradiation of the epigastrium (150 r of telecobalt through a field measuring 10 x 15 cm). Control studies were performed in 4 patients on 2 successive days after test meal admin. but without irradiation. The amount of duodenal liquid collected over a 2-hr. period was decreased after irradiation, whereas the amount in controls was increased in half and decreased in the other half. Polyethyleneglycol conc. was decreased in most of the irradiated patients and increased in all but 1 control. All irradiated patients showed a decrease in the amount of polyethyleneglycol collected over 2 hr., whereas 2 of the 4 controls showed a perceptible increase. The conc. of trypsin (with respect to polyethyleneglycol) was increased in irradiated patients and decreased in controls. Likewise, amylase conc. (with respect to polyethyleneglycol) was slightly increased after the test meal in irradiated patients but decreased in controls. Total bile acid conc. (with respect to polyethyleneglycol) was increased after irradiation (increase after 30 min., then decrease up to 90 min., then subsequent increase during the last half hr.) but stablized in controls. Av. pH values were slightly increased in both irradiated and control patients. The various factors (gastric emptying, hormone secretion by the duodenal wall, biliary and pancreatic response to test meal) which make any conclusive interpretations difficult are discussed.

9993 ADENOID CYSTIC CARCINOMA OF THE PAROTID GLAND. (E.) Blanck, C. (Karolinska Hosp., Stockholm), C. M. Eneroth, F. Jacobsson and P. A. Jakobsson. Acta Radiol. [Ther.] (Stockholm) 6(3):177-196, 1967.

A histologic re-examination and reclassification of a series of 1678 parotid tumors revealed that 299 were malignant, and 35 of these (2.1% of the 1678) were adenoid cystic carcinomas. There were 20 women and 15 men; the mean age was considerably lower in men. The age at which the tumor was first discovered ranged from 13-74 yr. (mean, 45.6) and the time of first treatment ranged from 13-79 yr. (mean, 49.3). In 28 cases, there was frank invasion of the salivary gland tissue. Pain was present in 14 (40%) and spontaneous facial paralysis in 10. Ten of the tumors were less than 3 cm in diameter, 15 were 3-5 cm and 7 were more than 5 cm in diameter; the size was not recorded in 3. Tumors were firmly attached in 19, and were mobile in 6. Demarcation was indistinct in 14 and well-defined in 11. In 1 there was dermal ulceration over the tumor. Surgical treatment was mostly conservative, consisting of extirpation in 31, partial parotidectomy in 1 and total parotidectomy in 3. Radiotherapy was given to 34 of 35 patients; it was preoperative in 17, intracavitary in 11 and postoperative in 17. There was local recurrence of the tumor in 21, of whom 17 died. In 14 in which no recurrence occurred, 4 died from the tumor disease and 5 from intercurrent disease.

Metastases occurred in 15, in 3 of whom it was detected on admission and in 12 during follow-up. There were distant metastases in 12, and involvement of the regional lymph nodes in 7. Only 1 patient with distant metastases survived for more than 5 yr. Follow-up was from 5-35 yr.; of 21 who died from the condition, 13 survived at least 10 yr. after appearance of the primary tumor and 4 survived at least 15 yr. The determinate survival rate fell from 73% for cases followed-up for more than 5 yr. as compared to 13% for the 20-yr. follow-up group. Thirteen of 16 with evidence of peri- and/or intraneural growth died, as against only 8 of 19 patients without such growth. Seven of 8 patients with many mitotic figures in the tumor(s) died. It is concluded that the long-term prognosis for this type of tumor is extremely poor, and attention is drawn to the grave significance of spontaneous facial paralysis.

9994 EXTRASALIVARY LYMPHOID ABNORMALITIES IN SJÖGREN'S SYNDROME (RETICULUM CELL SARCOMA, "PSEUDOLYMPHOMA", MACROGLOBULINEMIA).

(E.) Talal, N. (NIH, Bethesda, Md.), L. Sokoloff and W. F. Barth. Amer. J. Med. 43(1):50-65, 1967.

Eight patients who had Sjögren's syndrome from 2-20 yr. presented an array of extrasalivary lymphoid abnormalities to distinguish them, as well as 5 previously reported cases, from others with this syndrome. Lymphadenopathy or other extrasalivary infiltrates were sufficient to arouse clinical suspicion of lymphoma. In all 13 cases, lymphadenopathy was present in 10 and was a presenting complaint in 5. Cervical lymphadenopathy interfered with neck motion and caused cosmetic distress in 2 patients. Splenomegaly and leukopenia were each present in 10 patients. Seven had nonthrombocytopenic purpura, and vasculitis was demonstrated by skin or muscle biopsy in 7 and was probably the cause of peripheral neuropathy in 4. Reynaud's phenomenon and herpes zoster were each present in 4 cases. Salivary gland enlargement was universally observed whereas arthritis was infrequent and not typically rheumatoid. A variably marked infiltration of round cells, associated with atrophy of acinar tissue was present in all the biopsy specimens. Of the 8 case histories presented, 2 had primary macroglobulinemia, 1 had reticulum cell sarcoma and 5 had a syndrome designated as pseudolymphoma (4 of the latter had significant elevations of serum IgM macroglobulins). These data indicate that Sjögren's syndrome predisposes the development of extrasalivary lymphoid abnormalities.

9995 CLINICAL-DIAGNOSTIC VALUE OF DETERMINATION OF THROMBOCYTOPOIESIS IN PATIENTS WITH CANCER OF THE DIGESTIVE TRACT.

(Rus.) Anikin, B. S. (Kuibyshev Med. Inst., USSR). Vrach. Delo (6):18-20, 1967.

Thrombocytograms studied in all 135 patients (83 males, 52 females; age 25-75 yr.) and partial megakaryocytograms in 84 patients with cancer of
the digestive tract [esophagus in 21 (Stages
in 9; 3-4 in 12); stomach in 62 (Stages 1-2 i
3-4 in 42); large intestine in 21 (Stages 1-2
8; 3-4 in 13); rectum in 31 (Stages 1-2 in 14
3-4 in 17)] showed that megakaryocytic growth
bone marrow reacted to the development of mal
tumors. The most pronounced changes of megak
and thrombocytopoiesis occurred in Stages 3-4
especially at tumor localization in the large
testine and rectum; the changes of thrombocyt
and megakaryocytes in cancer occurred in para
manner. Thrombocytograms showed a marked shi
toward old blood platelets, especially pronou
at advanced stages, and a more pronounced inc
in old variability of thrombocytes was noted
tumor location in the lower part of the diges
tract (rectal cancer up to 50-59%); a decrease
the number of mature thrombocytes was more pro
nounced at advanced stages, and immature bloo
platelets, were mostly absent. In Stages 3-4
gastric cancer thrombocytes increased in sing
cases to 826,000-1,010,000/ml. A good functio
ability of blood platelets was noted in a stu
of thrombocytes in native preparations. Megakaryocytograms showed a significant percentag
degenerate cells (anisocytosis, cytoplasmic
vacuolization, nuclear polysegmentation, cellu
fragmentation, and others) especially in advan
stages. Degenerative signs were found in megakaryoblasts and especially in promegakaryocyte
and mature megakaryocytes. The highest numbe
of degenerate megakaryocytes was found in Stag
3-4 of large intestinal and rectal cancer. Th
amount of mature functioning megakaryocytes wa
decreased and thrombocytopoiesis was activated
among megakaryoblasts and promegakaryocytes.
Among some giant cells were found forms with
atypical division. Megakaryocytes were modera
decreased in all locations and stages of the
cancer process, except in single patients with
cancer metastatic to many internal organs, in
whom some increase (up to 250-300/ml) in giant
cells was noted. The changes in thrombocytogr
and megakaryocytograms were observed already i
the patients in Stage 2 of disease, therefore,
together with other clinico-laboratory indices
they could be used for timely diagnosis of mal
nant tumors.

9996 PHYSICAL AND PSYCHOLOGICAL EVALUATIC OF "NON-ORGANIC" ABDOMINAL PAIN. (E

Hill, O. W. (Middlesex Hosp., London) and L.
Blendis. Gut 8(3):221-229, 1967.

A consecutive series of patients, (31, 27 of w
were assessed by a psychiatrist) over the cour
of 1 yr., who complained of abdominal pain for
which no organic cause could be ascertained, w
assessed physically and psychologically. The
majority complained of epigastric pain associa
with distention, nausea without vomiting, loss
wt. or belching. These symptoms, together wit
lack of periodicity in the pain and failure to
obtain relief from food, differed significantl
from a carefully controlled group of patients
with peptic ulcers. When examined psychosocia

number of parents in the entire group of pa-
nts who had themselves suffered from abdominal
n, were significantly in excess to a control
up with organic pain, and many of them died
m this. The patients came from significantly
ger sibships than a control population, and
red high for neuroticism, as estimated by a
sonality inventory (Eysenck inventory). Fre-
ntly, the patients' symptoms began in a setting
bereavement, in some cases with recurrences
similar occasions, or otherwise followed by
e clear upheaval in their lives. Several pa-
nts were considerably depressed when seen, and
atment for depression was followed by disappear-
e of pain. Some seemed to benefit from the
hartic nature of their psychiatric interview.
a further group of patients, their symptoms
her disappeared or were greatly improved by
phenazine or sodium amytal, but not by a placebo.
ee illustrative case reports are given.

7 PRODUCTION OF DIARRHEA IN DOGS PREPARED WITH A GALLBLADDER-COLON FISTULA. (E.)
hambeau, J. O. (Brookhaven Nat. Lab., Upton,
Y.), M. Maetz, J. E. Jesseph and H. J. Brenneis.
h. Surg. (Chicago) 95(2):230-235, 1967.

rteen mixed-breed adult dogs of both sexes
e divided into 5 groups. In Group A, 2 animals
e prepared with an ileocolostomy, to study
effects of increasing conc. of bile salt on
colon. To evaluate the effect of diverting
entire bile secretion into the colon, dogs
Group B_1 were prepared with a gallbladder-colon
tula, with the common bile duct ligated; the
e duct was not ligated in 1 dog (Group B_3;
trol to these animals), and in others, Group C
dogs), it was arranged so that the bile was
erted out of the intestine by forming a gall-
dder-renal pelvis fistula. Nonoperated dogs
Group D served as normal controls. Stools
e arbitrarily classified as formed, mushy and
rrheic. In Group A, admin. of 0-0.5 g of
rocholic acid soln. into the colon produced
change in the type of stool excreted; admin.
1-2 g produced a slight change in the composi-
n of stools passed, and admin. of 3 g or more
ays produced diarrhea. Dogs of Groups B_2, C
D, receiving no taurocholic acid replacement,
reted normal stools. Group B_1 animals receiv-
no taurocholate replacement showed a distinct
nge in the type of stools excreted, with diar-
a predominating. When 0.2-0.4 g of taurocholic
d was admin. p.o., dogs in Groups B_2, C and D
ll had formed stools; the type of stools ex-
ted by dogs in Group B_1 changed from predom-
tely diarrhea to formed. When 1-3 g of tauro-
lic acid replacement was admin. p.o., there
no change in the type of stools excreted in
of the experimental groups. When 4-5 g of
rocholic acid was admin. p.o., dogs of Group B_1
eloped diarrhea; those of Group C showed no
nge in stool types, but those in Groups B_2 and
xcreted more mushy stools. When p.o. tauro-
lic acid was increased to 10 g, the type of
ol passed by Group C and D animals was unchanged; when the p.o. taurocholic acid conc. was increased to 20 g, diarrhea occurred in the controls (Group D). These results document the occurrence of diarrhea after instillation of increasing conc. of bile into the colon; approx. 3 g of taurocholic acid in the colon produced diarrhea. This study also documents the changing pattern of occurrence of diarrhea in nonirradiated animals prepared with a total gallbladder-colon fistula and receiving increasing conc. of p.o. bile salt replacement.

9998 THE PATHOLOGY OF PERITONEAL REPAIR: ITS RELATION TO THE FORMATION OF ADHESIONS. (E.) Hubbard, T. B. (Mercy Hosp., Baltimore, Md.), M. Z. Khan, V. R. Carag, Jr., V. E. Albites and G. M. Hricko. Ann. Surg. 165(6):908-916, 1967.

Peritoneal defects (1.0-6.0 cm in diameter) were created in Wistar rats, albino rabbits and mongrel dogs, and regeneration of the defects was studied; peritoneum regenerated not from the cut edges, but from metamorphosis of in situ mesodermal cells. All portions of a defect healed with equal rapidity, large defects as rapidly as small ones. Laparotomy was carried out on 25 mongrel dogs; in 5 the defects were left open, and in 5 each, they were closed with interrupted 4-0 silk, continuous 4-0 silk, continuous 4-0 plain catgut and continuous 4-0 chromic catgut, resp. Adhesions occurred in 30.1% of open defects, in 72.2% of defects closed with interrupted silk, and up to 90.2% of defects closed with continuous chromic catgut. Defects in parietal peritoneum were created in 60 dogs; on one side of each animal the defect was left open, and on the other side, a similar defect was closed with either interrupted 4-0 silk, continuous 4-0 plain catgut, or continuous 4-0 chromic catgut; open parietal defects resulted in many fewer adhesions than did sutured defects on the opposite side. Sixty open defects produced adhesions in 48.3% of defects; 60 closed defects produced adhesions in 98.3% of defects. This difference was statistically significant in all 3 groups, silk, plain catgut and chromic catgut. A series of cholecystectomies (220), colectomies (130) and hysterectomies (40) were reported in which no peritoneal closure was done giving no demonstrable complications due to this omission. It is concluded that peritoneal defects should not be closed, but should be left open.

9999 CEROID IN THE GASTROINTESTINAL SMOOTH MUSCLE OF THE THAI-LAO ETHNIC GROUP. (E.) Nye, S. W. (Walter Reed Army Inst. Res., Washington, D. C.) and K. Chittayosothorn. Amer. J. Path. 51(2):287-299, 1967.

Ceroid pigment deposits were found in the smooth muscle of the gastrointestinal tract in 105 (75%) of 139 Thai-Lao people of the Korat Plateau region of northeastern Thailand; 64% of the subjects autopsied were males, and the av. age at death was 25 yr., with a range of 1 mo.-70 yr. Pigment was most frequently present in the muscularis mucosae of the esophagus (100% of the affected cases); however, in the immediately adjacent area in the stomach cardia, the muscularis mucosae contained pigment in only 16% of the affected cases. The same type of relationship was found at the pyloroduodenal junction; 58% of the affected cases had pigment in the pyloric muscularis mucosae, but only 18% had pigment in the duodenal muscularis mucosae. The esophageal muscularis propria contained pigment in 37% of the cases, whereas the muscularis propria of the stomach had pigment in 21% of the cases. Also remarkably abrupt was the change in the amount of pigment in the muscularis propria of the stomach at the pylorus, where it was usually difficult to find (10%), and in the muscularis propria of the first portion of the duodenum, where it occurred in 80% of the affected cases. Ceroid was found in the distal duodenum-jejunum-ileum in 75% of the cases, in the colon in 35%, in bladder in 51%, in prostate or seminal vesicle or both in 50%, and in the uterus in 20% of the cases. It was found in the appendix in 49% of the cases, but was usually not heavily pigmented. Ceroid was occasionally found in the thyroid, respiratory epithelium, bronchial smooth muscle, vessels, splenic trabeculae, seminal vesicle epithelium and lymph nodes; in many patients a lipochrome pigment of some type was conspicuous in periadrenal fat. Examination of 48 appendices from patients in central Thailand revealed ceroid in only 2 cases, a markedly lower incidence. Total accumulation of pigment increased gradually with age, and the heaviest deposits were associated with liver disease. These pigment deposits apparently indicate that an antioxidant deficient state existed in the tissues of these people; they are probably indicative of chronic human vitamin E deficiency.

10000 THE ACUTE ABDOMEN IN FEMALE CHILDREN. (E.) Stephens, C. A. (U. Toronto, Canada). Ann. N. Y. Acad. Sci. 142(3):709-717, 1967.

Of 734 girls between 2 and 15 yr. of age with a suspected acute surgical abdomen, 227 (31%) were not operated upon; 507 underwent surgery and no definite diagnosis was made or a nonsurgical condition was found in 120. The main nonsurgical conditions giving rise to an acute surgical abdomen were mesenteric lymphadenitis, acute gastroenteritis, redundant sigmoid syndrome, acute pyelonephritis and pneumonia. In most cases, diagnosis was made on clinical grounds. Acute appendicitis (in 297) was the most common surgical lesion causing abdominal pain; the incidence of perforation was 63% of 297. Gynecological lesions had the highest incidence among those 11-15 yr. old. (10% of 203); a ruptured Graafian follicle was was the most common, then torsion of the ovary, ruptured corpus luteal cyst, torsion of a paraovarian cyst, tubo-ovarian abscess and reflux of menstrual blood. Intestinal obstruction was the cause of acute abdomen in 30 of 507. Between the ages of 2-4 the most common cause was intussusception. A positive diagnosis of peritonitis was made in 23 girls. Gallbladder disease and perforate peptic ulcer accounted for 0.5% of the girls between 2 and 15 yr. old. Trauma was a rare cause seen in only 2 cases. Under the age of 2 (in another study) acute surgical abdomen was due to intestinal obstruction in 90% of the cases.

10001 DIAGNOSTIC PERITONEAL LAVAGE IN ACUTE ABDOMINAL DISEASE: NORMAL FINDINGS AND EVALUATION IN 100 PATIENTS. (E.) Veith, F. J. (Cornell U. Med. Coll., New York, N. Y.), W. B. Webber, R. C. Karl and M. Deysine. Ann. Surg. 166(2):290-295, 1967.

Diagnostic trocar-catheter peritoneal lavages were evaluated in 100 patients with potential acute abdominal disease; diagnoses in these patients included perforated ulcer in 8, appendicit in 11, ruptured spleen or i.p. bleeding in 9, pancreatitis in 10, pelvic inflammatory disease in 6, mesenteric vascular occlusion, intestinal obstruction and other perforations of the gastrointestinal tract in 3 each, miscellaneous inflammatory conditions in 11 and 36 had no acute i.p. disease requiring operation. The fluid was examined for gross appearance, and analyzed for pH, protein, amylase, RBC, WBC and bacteria. Normal ranges of values were defined on the basis of 14 proven and 22 presumptive normal lavages with a trocar, and 10 normal lavages without a trocar. Approx. 50% of the normal lavages were pink or red in color and contained 3200-75,000 RBC/cc^3 of lavage fluid. In these 100 patients, 23 diagnostic lavages were of decisive aid in management of the patients; in 11 a planned but unnecessary operation was avoided and in 12 lavage guided reversal of a previous decision not to operate; lavages in 38 were of minor or confirmatory value. In view of technical modifications and normal values established, only 3 of the lavages were misleading; 2 were falsely positive and 1 was falsely negative. Only 1 lavage was not representative of peritoneal fluid. There were 5 incidental complications (mesenteric laceration in 2, and 1 each of entrance into intestine, laceration of psoas muscle and laceratio of the intestinal wall), but none was detrimental or required therapy. It is concluded that this procedure is indicated and of value in selected patients in whom diagnosis is difficult because of intercurrent medical or surgical problems. This procedure is contraindicated under the following circumstances: 1) when diagnosis can be made with clarity by standard means; 2) when ther are multiple scars and distended intestine; 3) in the differential diagnosis of appendicitis and pelvic inflammatory disease; 4) in the differential diagnosis of an overt localized inflammatory process; and 5) in pregnancy.

10002 PORTAL-SYSTEMIC VENOUS SHUNTS IN HEMORRHAGIC SHOCK IN THE DOG AND MONKEY. (E.) Waldhausen, J. A. (Indiana U. Med. Ctr., Indianapolis), F. L. Abel and W. L. Pearce. Ann. Surg. 166(2):183-189, 1967.

irreversible shock is accompanied by gross congestion in the small intestine of the dog, but not in the small intestine of the primate. In order to study the possible role of portal-systemic shunts as alternate pathways to drain the splanchnic circulation in the monkey, ^{85}Kr (at a conc. of approx. 1.0 mc/ml) and ascorbic acid were inj. into the portal vein. The isotope was monitored by a Geiger-Mueller tube in the expired air; and ascorbic acid was detected by a platinum electrode in the right atrium. Appearance times were sensitive to artificial portal-systemic shunt flows of 5 ml/min. Six dogs and 7 macaque monkeys (3 *Macacus rhesus*, 4 *Macacus nemestrina*) anesthetized with morphine sulfate and pentobarbital-Na were subjected to a standardized hemorrhagic shock procedure; the duration of hemorrhage av. 263 min. (range 158-397) in the dog and 164 min. (range 55-180) in the monkey. In the dog and the monkey, appearance time was shortened by 51.0 ± 8.6% and 62.1 ± 9.1% of control, resp., with reinfusion of the lost blood. When the portal vein was occluded, the appearance time in the dog was either greatly prolonged or the indicator never appeared. In the monkey, with portal vein occlusion, the appearance time became shortened, suggesting portal-systemic shunts. Although both dog and monkey had elevation of the portal pressure with occlusion, this was more pronounced in the dog (monkey: 29.2 ± 1.8 mm Hg; dog: 36.0 ± 1.9 mm Hg). Appearance time of ascorbic acid was always shorter than that of ^{85}Kr. These results suggest that portal-systemic shunts do decompress the portal vein in the monkey during hemorrhagic shock.

10003 FIBRINOLYTIC ACTIVITY OF COLOSTRUM AS A POSSIBLE ACTIVATING FACTOR OF GASTROINTESTINAL BLEEDING IN THE NEWBORN. (It.) Brughera, F. (Provinc. Inst. Child Protection & Assistance, Milan, Italy), P. Salvadori and F. Pellegrino. *Minerva Pediat.* 19(12):537-539, 1967.

The possible use of maternal milk in the treatment of gastrointestinal bleeding (melena) in the newborn is examined, and results are reported in 3 cases. The first infant presented melena at day 2 of life and had already been treated with vitamin K when maternal breast feeding was begun. Although no clinical improvement was observed, the syndrome gradually regressed within 3 days. Thrombocyte, thromboplastin, and residual prothrombin tests were normal. Colostrum differs from milk in its thromboplastin activity. Human plasma was then treated at 37°C with colostrum obtained from a primipara 2 days after parturition. No coagulation resulted, and colostrum appeared to have no thromboplastin activity, probably because of lack of Ca ions. The second infant presented with similar symptoms, but no anticoagulant therapy was admin. After the first 2 bloody stools (positive Abt test), milk from a woman who had given birth 20 days before was admin. (20 ml every 3 hr.). The first stool 8 hr. after treatment was normal in consistency and showed no trace of blood. The Meyer test, however, remained positive for the 6 subsequent stools, but was negative 36 hr. following treatment. Colostrum (20 ml per feeding) was then admin. and a moderately positive Meyer test occurred. With subsequent milk feeding, tests became negative again. In 5 test tubes, 0.7 ml of fibrinogen were added and then transformed into fibrin by the addition of standard thrombin; to each test tube were then added: 0.5 ml of colostrum, maternal milk, meconium, feces suspension from a breast-fed infant, and amniotic liquid, resp. After 80 min. of incubation at 37°, no trace of a coagulum was observed in the test tubes containing colostrum and feces. A third infant presented with melena at day 1. Routine tests were negative and no other signs of bleeding were present. Treatment with milk first, then colostrum, gave results similar to those seen in the second infant, although less marked. Colostrum from the mother when mixed in equal parts with plasma obtained from the child or mother or with control plasma (all with thrombin-induced coagulation) induced complete lysis of the coagulum after 45 min. in plasma samples obtained from the mother and child, but no change in the coagulum of the control sample.

10004 AN ARTERIOGRAPHIC STUDY OF MESENTERIC ARTERIAL DISEASE. I. LARGE VESSEL CHANGES. (E.) Dick, A. P. (Addenbrooke's Hosp., Cambridge, England), R. Graff, D. McC. Gregg, N. Peters and M. Sarner. *Gut* 8(3):206-220, 1967.

The large vessels of the mesenteric arterial system (celiac, superior mesenteric and inferior mesenteric arteries) were examined by lateral lumbar aortography in 100 cases. These were divided into 4 groups, the first 3 including patients without abdominal symptoms in whom aortography was performed for other reasons. These consisted of the following: Group 1, 27 controls, with no evidence of arterial disease, being studied because of abdominal masses, renal lesions, etc.; Group 2, 56 hypertensive patients having renal aortography; Group 3, 12 arteriopathic patients, mostly with intermittent claudication; and Group 4, 5 patients with chronic intestinal ischemia. The types of narrowing observed in this study included 1) ostial (nipping), which may result from a build-up of an atheromatous aortic plaque impinging upon the ostial origin of a mesenteric vessel; 2) plaque formation within the vessel resulting in stenotic narrowing with or without post-stenotic dilatation; 3) irregular stenosis; 4) annular smooth stenoses; and 5) segmental stenoses, which may be unilateral or bilateral. The 2 chief anastomotic developments seen were in the pancreatico-duodenal circuit and in the marginal artery of the colon. The inferior mesenteric artery was not seen at all in 40 patients. A method of estimating the sum of the cross-sectional areas of the celiac, superior and inferior mesenteric arteries is described. A significant difference was found between the means of total cross-sectional areas in the cases with ischemic gut disease and in all other groups, and between that in arteriopathic patients and the controls. There was considerable overlap of individual cases. No case was observed with intestinal ischemia in whom the total cross-sectional area of the main arterial trunks was not reduced to below 66% of normal. There was a significant difference between the amount of aortic atheroma found in controls and all other groups and between the hypertensive group and all other groups, but not between the arteriopathic group and those with probable ischemic intestinal disease. Renal artery abnormalities were found in 22 of 57 patients so-examined; these included stenosis of 1 or both renal arteries in 19, and 1 each of renal cyst, renal neoplasm and horseshoe kidney.

10005 IDIOPATHIC SEGMENTAL INFARCTION OF THE GREATER OMENTUM. CLINICAL AND EXPERIMENTAL CONTRIBUTION TO ITS PATHOGENESIS.

(Sp.) Sosa-Gallardo, C. A. (Cordoba Nat. U., Argentina), L. F. Kesner, A. Ferraris and A. H. Herrero. G.E.N. 21(3):221-246, 1967.

Four patients (a 13-yr.-old boy; 2 women, 1 of whom was 48 yr. old; a 61-yr.-old man) and data obtained from experimental studies on guinea pigs (10), dogs (6), and monkeys (2) were studied. Of 69 cases reported in the literature, venous thrombosis was observed in 20 (29%), while in the remaining 49 (71%) there was either no evidence of thrombosis (48%) or no mention was made of the condition of the veins (23%). Primary venous thrombosis does not seem to be the cause of idiopathic segmental infarction of the greater omentum. In fact, in the present series of 4 cases (3 segmental, 1 total), histopathological studies revealed the presence of signs and cellular elements characteristic of an allergic reaction and, in all cases, cure was obtained by antiallergic therapy (i.v. novocaine, antihistamines, and corticosteroids) without resorting to resection of the omentum. In experimental animals, an allergic reaction similar to that observed in humans was induced by the Arthus-Schwartzman technic using egg albumin and horse serum as antigens. It is concluded that the venous thrombosis observed in some patients with idiopathic segmental infarction of the greater omentum is a consequence and not the cause of infarction. By simple irritation (chemical, toxic, allergic) of the sensory fibers of the autonomic nervous system, characteristic lesions can be produced consisting of active vasodilatation, congestion, edema, hemorrhage, and others.

10006 PREVENTION AND TREATMENT OF EXPERIMENTAL ASCITES SUBSEQUENT TO STENOSIS OF THE INFERIOR VENA CAVA IN DOGS. (A NEW TECHNIC FOR ANASTOMOSIS OF THE THORACIC DUCT AND VENOUS SYSTEM).

(It.) Zotti, E. F. (Civil Hosp., Padua, Italy). Acta Chir. Ital. 22(6):679-692, 1966.

The effects of improved drainage of the thoracic duct in the prevention and treatment of ascites due to stenosis of the inferior vena cava were studied in 30 dogs of 14-16 kg wt. The following operations were performed: simple ligation of the inferior vena cava (Group 1); simultaneous ligation of the inferior vena cava and anastomosi of the thoracic duct and hemiazygos vein (Group 2 10 dogs); ligation of the inferior vena cava with anastomosis performed 7 days after the formation of ascites (Group 3; 6 dogs); only anastomosis of the thoracic duct-azygos vein with special non-suture technic (Group 4; 8 dogs); ligation of the inferior vena cava with anastomosis performed 7 days after ascites formation, using the same non-suture technic as in the previous group (Group 5; 6 dogs). Animals of Group 1 all developed ascites (200-320 ml) within 6-8 days; lymphangiography revealed marked congestion of abdominal and periaortic lymph nodes and thoracic-duct distention. Six dogs of Group 2 were sacrificed 30 days after surgery and no signs of ascites or lymphaticovenous abdominal congestion were present; 2 dogs were kept for a long term as controls and were in good condition at 160 days; anastomosis was pervious in these animals; technic was faulty in 1 dog. In animals of Group 3, ascites disappeared 48-72 hr. after anastomosis; lymphangiography after 1, 7, and 30 days revealed no congestion of abdominal lymph glands, but some venous stasis of abdominal organ was seen. Anastomosis was successful in 5 animal of Group 4, 3 of which were in good condition 124 and 130 days after surgery; 1 dog died from hemo- and chylothorax due to disinsertion of the thorac duct; in 2 dogs who showed signs of clinical complaints, occlusion of the anastomosis occurred before day 30. Anastomosis was pervious in 4 dog of Group 5 30 days after surgery; ascites had disappeared within 48 hr. and an increased flow was observed at the anastomosis site. Results indicate a predominant role of the lymphatic system in the formation of ascites, and further studies are urged with a view to application of the above technic to various clinical conditions (decompensated cardiac congestion and esophageal varice

10007 ELECTRON-MICROSCOPE STUDIES OF EXPERIMENTAL SALMONELLA INFECTION IN THE PRECONDITIONED GUINEA PIG. II. RESPONSE OF THE INTESTINAL MUCOSA TO THE INVASION BY Salmonel typhimurium.

(E.) Takeuchi, A. (Walter Reed Army Med. Ctr., Washington, D. C.) and H. Sprinz. Amer. J. Path. 51(1):137-161, 1967.

Guinea pigs which were preconditioned by 4 days of starvation and then admin. 1 ml of tincture of opium i.p. prior to the admin. by stomach tube of 10 ml of broth which was infected with Salmonella typhimurium usually succumbed within 3 days to a systemic infection with septicemia. The ileum was affected by an acute, diffuse, nonspecific enteritis which was first noted at the 12-hr. stage and progressed in intensity to the 48-hr. stage. The enteritis was characterize by a progressive alteration of the mucosal architecture with a shift in the ratio of the villo to the nonvillous portion of the mucosa. There was blunting, swelling and foreshortening of villi; elongation of the crypt glands and emptyin of goblet cells; increased and abnormal extrusion

epithelial cells (compensated in part by in-
ases mitosis). The bacteria first penetrated
epithelial lining of the intestinal villi and
after a 24-hr. lapse penetrated the lining
the crypt glands. They were rapidly cleared
the intestinal lumen and the epithelial lining,
persisted in the lamina propria and even
iferated within macrophages. These changes
accompanied by a progressive inflammatory
tion of the lamina propria with engorgement
he vessels and an inflammatory cell exudate
ciated with an increased transepithelial mi-
ion of these cells. Vascular changes in the
stinal mucosa became evident and were char-
rized early by intravascular platelet thrombi
later by alterations of the thrombosed vessel
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8 METHAEMOGLOBINAEMIA AND INFANTILE GASTROENTERITIS.

(E.) Hoh, T. K.
. Hosp., Singapore). J. Singapore Paediat.
8(1):18-23, 1966.

l cases of acquired methemoglobinemia in
nts, and children, 70.5% had gastroenteritis
ients admitted for gastroenteritis comprised
25% of the total admissions). All of these
s developed methemoglobinemia after taking
l Chinese medicinal powders or oil, except
2 cases which had imbibed well water and 4
s of gastroenteritis that were not given any
cation before admission. An additional study
0 cases of gastroenteritis who were not given
medication before admission and whose source
ater supply was not from wells, was performed
etermine the reason for the high incidence
ethemoglobinemia among infants with gastro-
ritis. The initial methemoglobin level in
e patients was higher than the normal value;
was associated with a low level of alkaline
rve in the blood. Daily estimation revealed
, as the level of alkaline reserve rose to
al, the methemoglobin level dropped to a
al level, although no treatment for methemo-
inemia was instituted. Since the methemo-
in was calculated as percent of total hemo-
in and some of the cases were only mildly
drated on admission, it was thought that the
ial high level of methemoglobin in this group
nfants was not related to dehydration and
concentration, but to acidosis. This finding
ests that infants with gastroenteritis, es-
ally those with acidosis, are more susceptible
ethemoglobinemia when given certain medications
that the presence of acidosis favored the
ation of methemoglobin.

IMMUNITY AGAINST EXPERIMENTAL CHOLERA.

(E.) Finkelstein, R. A. (SEATO Med.
Lab., Bangkok) and P. Atthasampunna. Proc.
Exp. Biol. Med. 125(2):465-469, 1967.

ification of the intestinal loop technic
sed for titration of the effect of choleragen
nfection with Vibrio cholerae 569 B Inaba on enterosorption in control and immunized adult rabbits; 5 loops of terminal ileum were made in each animal, with 1-inch segments intervening. Four loops were inoculated with 0.1 ml amounts of dilutions of purified choleragen in saline and 1 loop received 1 ml of 1.0% peptone saline containing 10^8 viable V. cholerae harvested from 6-hr. growth on meat extract agar plates. Skin reactivity to choleragen was assayed in the same groups of rabbits. Immunization was accomplished by parenteral inj. of choleragen in Freund's complete adjuvant; purified choleragen dissolved in sterile physiological saline was mixed with an equal amount of adjuvant so that each 5 ml contained 5 mg of choleragen. Serial dilutions of sera were tested for agglutinins against live vibrios, using infant rabbits. In immunized rabbits, only 2 of 6 animals responded to massive live vibrio challenge, and then to a lesser degree than controls, all of which responded with marked outpouring of fluid into the loops. Immunization also conferred a marked, although not absolute, degree of resistance to intraintestinal challenge with choleragen. Similarly, skin reactivity to intradermal choleragen was markedly decreased in the immunized group, in comparison with simultaneous controls. Neutralization tests showed that each of the postimmunization sera neutralized choleragen, with 1 possible exception. Each of the postimmunization sera had antibodies capable of precipitating choleragen in Ouchterlony tests. All sera from immunized rabbits contained high levels of agglutinins. Parenteral immunization with choleragen actively protected adult rabbits against intestinal challenge with either live vibrios or with choleragen, and a partial degree of immunity to the choleragen may be passively transferred to infant rabbits by means of serum admin. parenterally before challenge.
It is concluded that choleragen offers promise as an effective immunogen against cholera.

10010 ELECTROLYTE REPLACEMENT IN PAEDIATRIC CHOLERA.

(E.) Griffith, L. S. C.
(U.S. Naval Med. Res. Unit No. 2, Taipei, Taiwan),
J. W. Fresh, R. H. Watten and M. P. Villaroman.
Lancet 1(7501):1197-1199, 1967.

Electrolytes were determined in the stools of 58 children with cholera from the Philippines; Group 1 consisted of 19 who were bacteriologically positive for Vibrio cholerae Ogawa (el Tor); and Group 2 consisted of 39 selected from random admissions to the main cholera ward at San Lazaro. Electrolyte losses in the stool were substantially different from those found in adults with cholera. Fecal losses of Na, Cl and bicarbonate were lower, and fecal losses of K were higher, than in adults. Since i.v. soln. for replacement therapy are commonly devised on the basis of adult losses, their use in pediatric cholera provides more Na and Cl than is lost in the child's stool. In addition, such regimens rely too heavily on the p.o. route for admin. of free water (water not containing saline). It is suggested that most of the morbidity and mortality seen in pediatric cholera may be due to over-replacement of Na losses and failure to provide free water i.v.

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10020 TREATMENT OF ENDOTOXIN SHOCK IN THE COURSE OF POSTOPERATIVE PERITONITIS. (Pol.) Piskorz, A. (1st Surg. Clin., Poznan, Poland), K. Stengert, W. Jurczyk, K. Brodzinska and S. Adamiak. Pol. Tyg. Lek. 22(2):53-56, 1967.

10021 BEHAVIOR OF FOREIGN BODIES IN THE DIGESTIVE TRACT. (Cz.) Drtil, J. Cesk. Gastroent. Vyz. 21(4):260-263, 1967.

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Clin., Erfurt, Germany), J. Vick and W. D.
Neutsch. Z. Aerztl. Fortbild. (Jena) 61(14):7
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10089 AMMONIA TOLERANCE IN THE DIAGNOSIS OF ESOPHAGEAL VARICES. A COMPARISON OF ENDOSCOPIC, RADIOLOGIC, AND BIOCHEMICAL TECHNIQUES. (E.) Conn, H. O. (VA Hosp., New Haven, Conn.). J. Lab. Clin. Med. 70(3):442-451, 1967.

The results of ammonia tolerance tests were compared with radiologic and esophagoscopic examinations for esophageal varices in a consecutive group of 275 cirrhotics (262 with Laennec's cirrhosis, 8 with postnecrotic cirrhosis, 4 with hemochromatosis and 1 with biliary cirrhosis; diagnoses were established histologically in all but 5 patients); ammonia tolerance tests were also performed on 24 normal subjects or healthy volunteers, and on 21 patients with fatty infiltration and/or portal fibrosis of the liver which was established histologically. Values of less than 150 μg ammonia N/100 ml were considered to be normal; ammonia tolerance levels greater than 250 μg/100 ml were considered diagnostic of esophageal varices, and values less than 250 were indicative of absence of varices. In the normal controls, ammonia tolerance tests av. 117 ± 13 μg/100 ml, with a range of 88-136; in those with fatty infiltration and/or portal fibrosis of the liver, they av. 120 ± 27 μg/100 ml, with a range of 80-190 μg/100 ml; 3 of these 21 patients had values less than 150 μg/100 ml, and 4 of the 21 had varices as shown by esophagoscopy. In 384 tolerance tests in the cirrhotic subjects, the av. was 243 ± 129 μg/100 ml, with a range of 80-722; 116 of 384 (30%) tolerance tests were normal; in 236 tests (61%), values were less than 250 μg/100 ml, and in 148 tests (39%), values were 250 or over. Esophageal varices were detected by esophagoscopy in 43% of the patients, by radiologic examination in 37%, and on the basis of ammonia tolerance, in 39%. Ammonia tolerance tests agreed with radiologic examinations in 69%, with endoscopic examinations in 70%, and with 77% of the group of patients in whom both esophagoscopic and radiologic interpretations agreed. By comparison, Ba contrast examinations agreed with esophagoscopy in 71%. The magnitude of esophageal varices by esophagoscopy correlated closely with the degree of abnormality of ammonia tolerance. These studies indicate that the ammonia tolerance test is a reliable screening test for the presence or absence of esophageal varices. It is also useful as a biochemical index of esophageal varices in confirming or refuting the interpretations of radiologic and esophagoscopic methods.

10090 THE ESOPHAGEAL PROPULSIVE FORCE: ESOPHAGEAL RESPONSE TO ACUTE OBSTRUCTION. (E.) Winship, D. H. (Marquette U. Sch. Med., Milwaukee, Wis.) and F. F. Zboralske. J. Clin. Invest. 46(9):1391-1401, 1967.

In 11 (9 men, 2 women; 23-40 yr. old) healthy adult volunteers without evidence of esophageal disease, the response of the normal human esophagus to an obstructing intraluminal bolus was studied and compared to the response evoke by transient intraluminal distention. A ballo immobilized within the esophagus by external a tachment to a force transducer, was inflated w from 3-25 ml of air for 3-210 sec. Pressure phenomena occurring in the esophagus were simu taneously recorded from the body of the esopha above and below the balloon. Transient disten (5 sec. or less) with small vol. (5 ml or less often evoked a secondary peristaltic wave in t esophagus distal to the balloon, but infrequen resulted in the registration of any force exer upon the balloon to drive it downward. Conver distentions of longer duration and with greate vol. elicited an esophageal propulsive force e erted upon the balloon oriented to propel it aborally, and much less often evoked a propaga wave of secondary peristalsis. The propulsive force, obviously resulting from esophageal mus contraction, occurred promptly, and once initi was sustained until deflation of the balloon. It varied widely in magnitude, from 4-200 g, a was associated with no motor phenomena recorde from the body of the esophagus proximal or dis to the balloon which could account for its pre ence, onset, magnitude or duration. The force was inhibited by deglutition, but arrival of the primary peristaltic wave at the bolus resu in augmentation of the force. When the obstru ing balloon was freed from its attachment, the persistent, stationary force was converted to a propagated one that propelled the balloon before it. If the balloon was arrested before entering the stomach, the moving contraction w also arrested and the persistent propulsive fo acting upon the balloon was maintained. The velocity of the moving contraction wave was determined in great part by the resistance offer by the bolus. Unrestrained, the balloon was propelled aborally at 4-8 cm/sec. by the esoph propulsive force; when restrained by 50 g, the rate of passage was reduced to 0.2-0.8 cm/sec. The esophageal response to intraluminal distention is thus not limited to the uninterrupted wave of secondary peristalsis, but is versatil and is determined by the nature of the distending bolus. Transient distention by a mobile o collapsible bolus elicits the propagated secon peristaltic wave.

10091 THE LOWER ESOPHAGEAL INTRINSIC SPHINCTER AND THE MECHANISM OF REFLU EXPERIMENTAL OBSERVATIONS SUPPORTING A NEW CONCEPT. (E.) Anderson, H. N. (U. Washington Sch. Med., Seattle), K. J. May, Jr., G. P. Steinmetz, M. Ofstun, H. G. Harrison, R. M. Le and D. H. Dillard. Ann. Surg. 166(1):102-108, 1967.

Experimental observation on 82 dogs with a variety of surgical procedures confirmed the presence of a functional intrinsic lower esopha eal sphincter and established this as the prim anism for the prevention of esophageal reflux its attendant acid-peptic esophagitis. This r esophageal sphincter can function in the athoracic position, and it also functions in absence of the diaphragmatic pinchcock mechan- or the acute angle of entry into the stomach. he absence of a functional intrinsic sphincter, e other factors, alone or in combination, are pable of preventing reflux. In the dog, the al intrinsic lower esophageal sphincter is un- to function properly when interference with action is produced by distraction from ab- al traction or abnormal insertion of the noesophageal membrane into the esophagus or . This situation may occur in some humans may explain in some cases why reflux is an nstant finding with esophageal sliding hiatal ias.

2 A COMPARATIVE STUDY OF NATURALLY OCCURRING CANINE ACHALASIA. (E.) Hoffer, . (U. Pennsylvania Sch. Med., Philadelphia), aldes-Dapena and A. E. Baue. Arch. Surg. cago) 95(1):83-88, 1967.

ical and pathologic aspects of human and ne achalasia were compared, employing 25 dogs naturally occurring achalasia. Vomiting n 10-20 min. after eating or nursing during early stages of the disease, with the vomitus isting of mostly undigested food. The vomitus much more fluid in consistency during later ges, and in advanced achalasia consisted of a dorous, viscous fluid which was obtained when head was lowered. Physical examination re- ed poor nutrition, wt. loss and enlargement he metaphyses of long bones suggestive of kets. A dilated saccular esophagus was palp- above the thoracic inlet. Recurrent pneu- tis was observed in most dogs. Thoracic y revealed great dilatation of the esophagus, le fluoroscopy demonstrated a generalized phageal dilatation, absence of esophageal peri- sis, and passage of Ba into the stomach de- dent on the esophageal fluid level. A zone increased pressure, but within normal limits, observed in the distal esophagus. Two of the ogs treated by modified Heller procedure and y kibble diet showed normal esophageal di- ters at 5-mo. follow-up. Myenteric ganglion nts decreased with the duration of the disease. cellular reduction is considered secondary not causative of achalasia in the dogs studied. se findings suggest that further study of ine achalasia should prove helpful in the cidation of human achalasia.

3 THE VALUE OF PALLIATIVE PROSTHESES IN MALIGNANT LESIONS OF THE ESOPHAGUS.) Duvoisin, G. E., F. H. Ellis, Jr. and W. S. ne. Surg. Clin. N. Amer. 47(4):827-831, 1967.

ariety of prosthetic tubes were inserted in patients with malignant esophageal obstruction. phageal obstruction had caused almost all of them to experience difficulty in swallowing, which in many had progressed to allow only liquid intake. Symptoms had been present from 1 wk.-24 mo., av. approx. 5 mo., but in two-thirds they had been present less than 2 mo. Fistulous connections between the esophagus and the tracheobronchial tree were present in 7 patients. Wt. loss was observed in all but 2 cases (av. 24 pounds). Sites of the lesions were tabulated in 3 zones: the upper half of the thoracic esophagus (24%), the lower half (20%) and the esophagogastric junction (56%). Of the primary carcinomatous lesions examined, 46% were adenocarcinomas and 43% squamous-cell carcinomas. In 1 case, a cylindroma of the bronchus had extended directly into the esophagus. Celestin tubes were used in 59, Mackler tubes in 26, Berman tubes in 8 and the Tygon, and Mousseau-Barbin tubes in 1 each. There were 13 hospital deaths (14%); 4 were due to primary malignant disease, and intubation was implicated in the remaining 9. Fatal mediastinitis occurred in 5 cases after insertion of Mackler tubes. Of 93 patients in whom intubation was successfully accomplished, 42 developed 1 or more complications related directly to the tube or its insertion (including the 9 previously-mentioned fatal complications contributing to operative mortality). Wound infections were the most frequent problem, occurring in 20 cases (18 Celestin tubes, 2 Mackler). Serious complications such as obstruction, migration and gastrointestinal leaks were present in 29 patients, but the incidence was nearly twice as great with the Mackler tube as with the Celestin tube. Of those surviving insertion of Mackler tubes, 30% developed an obstruction, contrasted with only 11% in the Celestin-tube group. Massive gastrointestinal hemorrhage occurred in 7 patients with Celestin tubes and was fatal to all but one of them. The av. survival time of patients was 4.5 mo., with a range of 2 wk.-32 mo.; only 13 of 95 patients lived more than 6 mo. Adequate palliation was accomplished in 70% of the 73 patients evaluated, with the great majority swallowing well for 80% or more of their survival time. Only 56% (10) of those with Mackler tubes received adequate palliation, in contrast to 73% (35) of those with Celestin tubes. Generally patients with tracheoesophageal fistula did not benefit from palliative intubation. The Celestin tube provided the best palliation; those patients in whom a Celestin tube was employed had lesions which were more unfavorable both clinically and pathologically than those in the group who had Mackler tubes; yet the Celestin tubes were inserted with lower operative mortality, were associated with a lower incidence of significant complications and produced adequate palliation in a higher percentage of cases than the Mackler tubes.

10094 ANASTOMOSIS BETWEEN THORACIC DUCT AND ESOPHAGUS WITH MICROSURGICAL TECHNIQUE. (E.) Oh, C. Y. (Mt. Sinai Hosp., New York, N. Y.), M. C. H. Wang, C. A. Danese and J. H. Jacobson II. Surgery 62(2):340-345, 1967.

Anastomosis of the thoracic duct to the esophagus with microsurgical technics was performed in 55 dogs; they were divided into 3 groups: Group A, 36 normal animals; Group B, 14 with ascites produced by constriction of the supradiaphragmatic inferior vena cava; and Group C, 5 animals with ligation of the common bile duct. The latter 2 groups were used because they were the 2 pathological situations in which lymph flow was markedly increased, and where prolonged drainage of lymph appeared to have promise of clinical usefulness. Five types of thoracic duct-esophageal fistulas were constructed: edge-to-edge anastomosis, overlapping technic, subclavian anastomosis, intrathoracic jugular anastomosis and addition of stent (done in conjunction with the first 3 anastomoses); the actual anastomoses were not to the thoracic duct itself, but to venous structures. Jugular anastomosis to the intrathoracic esophagus was an attempt to utilize the massaging action of intermittent negative pressure developed during respiration to assist lymph flow and maintain patency of the anastomosis. No anastomosis patent beyond 1 wk. was observed in any of the animals, in spite of the variety of methods of fistula construction and production of increased lymph flow by interior thoracic vena cava constriction or common bile duct ligation. The principal cause of failure was the presence of excess granulation tissue at the site of anastomosis; in others, marked inflammatory changes due to anastomotic disruption were noted. In those with catheter stents, there were no anastomotic disruptions, but rather occlusions of the catheter lumen by blood clot and lymph clot. It is suggested that secretion of the gastrointestinal tract has an inflammatory action on vascular endothelium and leads to early occlusion by granulation tissue and eventual fibrosis of the vessel itself. The potential usefulness of this technic in treatment of ascites and biliary atresia makes enteric-thoracic duct fistula a goal worth achieving.

10095 AN EXPERIMENTAL STUDY OF THE GASTRO-ESOPHAGEAL REFLUX AND OF METHODS FOR ITS SURGICAL ELIMINATION. (Rus.) Kanshin, N. N. (Moscow Med. Inst.). Sovet. Med. 29(12):92-95, 1966.

Anatomic preparations of "stomach-cardia-esophagus" were made from cadavers by removal of the stomach with the gastric ligamentum and the lower portion of the esophagus, which was hermetically connected with a transparent sac (from polyethylene film); at the region of connection a ring was placed for easier attachment of the sac to the esophagus. One-third of the stomach was filled with a blue soln. and the region of the pylorus was ligated with a thread; the cephalic end was dropped at 30° angle. In Experiment 1, gastric fluid began to flow into the esophagus after increase of the angle of His to 60° or more. In Experiment 2, gastro-esophageal reflux was produced by pulling to the side of the esophagus, which increased the angle of His. In experiment 3, pulling of the esophagus in the cephalad direction caused dilatation of the gastro-esophageal angle and the
appearance of reflux. In Experiment 4, attac
of a small splint (for initiation of cardial
at the esophageal opening) caused leveling of
angle of His and created conditions for free
flow of gastric fluid into the esophagus. In
Experiment 5, formation of slight (artificial)
muscular tonus of "esophageal press" delayed
duction of reflux. In Experiment 6, placing
nodular sutures between the left esophageal w
and the gastric fundus markedly delayed the a
pearance of reflux. In Experiment 7, underne
suturing of the gastric fundus to the esophag
(at the larger surface) improved the results
esophagofundoraphy; it was most effective in
bination with initiation of muscular tonus of
"esophageal press". In Experiment 8, removal
the rubber strap and sutures resulted in discontinuing the function of the cardial valve
mechanism, even with a large esophagofundorap
In Experiment 9, longitudinal myocardiotomy b
the Heller technic, involving the cardia and
of the esophagus, produced reflux. All of th
experiments were repeated on 5 preparations.
Experiment 10 (studied on 10 preparations), f
plication according to Nissen always formed a
reliable flap valve in the cardial area; this
worked well even in the complete absence of t
of "esophageal press" and common rigidity of
esophageal wall. The cardia submerged into t
fold became impenetrable (moving toward the
esophagus) for water and air.

10096 VARIATIONS IN THE COLON ARTERIES STRUCTURE WITH REGARD TO COLONIC ESOPHAGOPLASTY. (Rus.) Shiriaev, I. I. (Odes Pirogov Med. Inst., USSR). Vestn. Khir. Greko 98(3):35-40, 1967.

A study made on 104 cadavers (76 males and 28
females who died at 12-86 yr. of age) revealed
basic forms of the structure of the colic arteries: 1) single-stem; 2) transitory, where
the basic stem is divided into 2 almost ident
thick branches; and 3) loose, wherein the col
artery is broken up into branches. In 51 of
preparations, the right colic artery as an independent stem was absent, the ileocolic, cen
and left colic arteries had a single-stem str
the left colic artery ascended vertically and
transplant could be formed from the transverse
colon with the splenic arc and from the desce
colon with the left third of the transverse c
In 32 of 104 preparations, the right colic ar
was absent; the ileocolic, central and left c
arteries had a loose structure, the left colic
artery passed up or ascended almost verticall
an extraorganic bond between the central and
colic arteries was absent; a transplant could
formed only in the region of the left half of
the colon. In 21 of 104 preparations, the ar
system of the colon was presented by 4 arteri
the ileocolic artery had a transitory structu
the right colic artery had a loose structure,
central and left colic arteries had a single-
structure; and the left colic artery passed u
and to the left into the region of the splenic
arc of the colon; a transplant could be formed

rom the transverse colon with the splenic arc, rom the descending colon with the left third of he transverse colon, and from two-thirds of the ransverse colon with the upper-half of the decending colon. An arterial system of the colon onsisting of 4 colic arteries of transitory form nabled formation of a transplant with a well-exressed marginal vessel: from the right half of he colon in an isoperistaltic position, from the ransverse colon with the splenic arc in the ntiperistaltic position, from the descending olon with the splenic arc in an antiperistaltic osition, and from the transverse colon with part f the descending colon in the isoperistaltic osition.

0097 PROGRESSIVE SYSTEMIC SCLEROSIS: II. ESOPHAGEAL INVOLVEMENT. CORRELATION ETWEEN BLIND BIOPSY OF THE ESOPHAGUS, ACID DRIP EST, AND RADIOLOGY. (E.) Bettarello, A. (Med. ch., Sao Paulo, Brazil), T. Brito and S. Zaterka. mer. J. Dig. Dis. 12(8):808-812, 1967.

total of 22 patients (18 female, 4 male; 21-56 r. old, with a mean of 34.3 yr.) with progressive ystemic sclerosis were examined by blind biopsy f the distal esophagus (with a modified Wood iopsy tube), X-ray examination of the esophagus nd the acid drip test (Bernstein and Baker test, s modified by Bettarello). The patients were ivided into 2 groups according to the presence r absence of heartburn. Of those with heartburn 15), the Bernstein test was positive in 14 93.3%); esophageal biopsy failed in 3 patients gastric mucosa instead of esophageal mucosa was btained), and 11 of the remaining 12 demonstrated sophagitis by biopsy; esophagitis could be adiologically demonstrated in only 3 patients f this group, and in 2 of them there was histologcal confirmation. Of 7 patients with no heartturn, the acid drip test was negative in all of hem; biopsy of the esophagus was successful in ll 7 patients, and in 2 of them esophagitis was bserved, but the inflammation was limited to he lamina propria. It is concluded that blind iopsy may be useful in the diagnosis of esophagtis in situations in which visualized biopsies annot be performed for technical reasons.

0098 CLINICAL, MANOMETRIC, AND PATHOLOGICAL STUDIES IN DIFFUSE OESOPHAGEAL SPASM. E.) Gillies, M. (Roy. Prince Alfred Hosp., ydney, Australia), R. Nicks and A. Skyring. rit. Med. J. 2(5551):527-530, 1967.

f 21 patients studied, 8 were under the age of 0, 7 between 40 and 60, and 6 over 60, with an qual sex distribution; all had histories of ntermittent episodes of dysphagia and chest ain, and the replacement of peristalsis by ynchronous contractions of the esophagus, often epetitive and of high pressure. Motility tudies were done using a direct writing polyraph connected to open-tipped, water-filled esophageal catheters by pressure transducers; simultaneous recordings were taken at 2 or 3 points 5 cm apart at 1-cm intervals throughout the length of the esophagus. Radiologic pictures of Ba swallows were done in all patients; the severity of the radiologic changes did not show a close correlation with the clinical, manometric or pathological findings. Analysis of motility patterns has better defined the abnormalities expected in patients with severe diffuse spasm; disturbances of motility occurred mainly in the mid- and lower-thirds, but in some patients, in the upper third. Synchronous activity was present after every swallow recorded in the lower esophagus and was present in the upper third in 8 of 10 swallows. Repetitive activity with 2-5 contractions after swallowing, and lasting up to 30 sec. each, was found in 20 patients; and in the upper-third in 10; contractions lasting longer than 6 sec. were present in the upper-third in 11 patients and in the lower 66% in all; duration ranged from 4-20 sec. In the lower 66% of the esophagus pressures after swallowing and during repetitive and spontaneous activity ranged from 20-120 mm Hg and were often greater than 60 60 mm Hg; mean resting pressure was from 5-25 mm Hg. Symptoms in 7 patients were severe enough for esophagomyotomy; all were relieved of pain and dysphagia and became asymptomatic; there were no complications; at operation it was noted that the esophageal muscle extending from the cardia to the level of the aortic arch was thickened; in some cases 2 cm thick. The other patients were managed conservatively for periods up to 4 yr.; later motility studies on these people were almost identical with the original studies.

10099 CLINICAL AND RADIOLOGIC ASPECTS OF CONGENITAL SHORT ESOPHAGUS. (It.) De Maria, A. (U. Rome) and G. Cocchieri. Arch. Chir. Torac. 21(1):25-50, 1967.

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10108 ENTEROGENOUS CYSTS OF THE OESOPHAGUS. (E.) Latimer, R. D. (Middlesex Hosp., London). Brit. J. Dis. Chest 61(3):136-137, 1967.

10109 BLOOD BLISTERS AND THE OESOPHAGEAL CAST. (E.) Badham, N. J. (Leicester Roy. Infirm., England). J. Laryng. 81(7):791-803, 1967.

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10140 SLIDING HERNIA OF THE DIAPHRAGMATIC HIATUS AND OTHER DEFECTS AND DISEASES OF THE ESOPHAGUS, STOMACH AND DUODENUM. (Pol.) Kowalski, W. (Municipal Hosp., Piotrkow Trybunalski, Poland). Pol. Tyg. Lek. 22(26):992-994, 1967.

See also abstract nos.: 9850,10156,10828

STOMACH

(Gastric ulcer is placed with peptic ulcer)

10141 PANCREATIC FUNCTION AND THE ABSORPTION OF FAT, IRON, VITAMIN B_{12} AND CALCIUM AFTER TOTAL GASTRECTOMY FOR GASTRIC CANCER. (E.)

Fischermann, K. (Blegdams Hosp., Copenhagen), S. Harly, H. Worning and A. Zacho. Gut 8(3): 260-266, 1967.

Twelve patients (7 male and 5 female, aged 45-73 yr.) who were treated by either Roux-Y or interposition type total gastrectomy were evaluated with respect to general condition, pancreatic function and absorption. No patient at follow-up (0.5-15 yr.) had postprandial complaints, dumping, or abnormal stool appearance, and all could ingest normal food portions. Serum protein distribution was within normal limits in all cases, however 2 patients did manifest moderate anemia and reduced serum Fe levels. Three patients with a follow-up of less than 1.5 yr. showed reduced Fe absorption. Ca retention after 7 days was below 12% (12-24% in 5 normal subjects) in 2 patients with a follow-up of less than 1 yr; however, both had normal serum levels of Ca. One patient with reduced serum Ca levels but with normal Ca absorption did manifest frank osteoporosis. The pH of the small intestine (except for the first portion) was significantly higher than that found in healthy persons with achlorhydria. The av. daily fecal excretion of fat in 3 patients with Roux-Y procedures was 18-55 g. It is concluded that when surgical anastomosis is well established, total gastrectomy for the treatment of gastric malignancy is a satisfactory procedure.

10142 ACID-BASE CHANGES AFTER GASTRIC SURGERY. (E.)

Parkin, G. (Gen. Infirm., Leeds, England), G. R. Giles and C. G. Clark. Brit. J. Surg. 54(7):629-632, 1967.

Alterations in acid-base balance in response to a test meal was examined by measuring the changes found in arterialized blood drawn from the back of the hand previously warmed. Test Meal 1 consisted of 500 ml of a milk mixture, 325/mOsmoles/kg, including 11.8 g protein, 34.4 g fat, 62.0 g carbohydrate, and a total of 592 calories; Test Meal 2 was also 500 ml of a milk mixture, 354/mOsmoles/kg, including 30.1 g protein, 16.2 g fat, 86.2 g carbohydrate and 603 total calories. These test meals were designed to minimize any effects of dumping by providing a feed with an osmolar conc. similar to that of small intestinal contents. Normal control subjects included 10 men (23-38 yr. old) and 6 women (23-51 yr. old); patients (26) who underwent gastric surgery were all men, 31-69 yr. old including 10 who had gastrectomy several mo. or yr. previously, 5 with a Polya gastrectomy, 4 with vagotomy and gastroenterostomy, and 7 with vagotomy and pyloroplasty. Results were variable after the first test meal. After the second test meal (in which the fat was decreased and the carbohydrate content increased), response in normal subjects was a mild metabolic alkalosis; change was max. in the first hr. and returned to the previous basal level by the third hr.; this corresponded to the period of acid secretion during the digestion of food. After the second test meal, an acidotic response was elicited in 4 of 5 patients with partial gastrectomy, 2 of 4 patients with vagotomy and gastroenterostomy, and 3 of 7 patients with vagotomy and pyloroplasty; a general correlation was found with acid secretion in that those patients with achlorhydria or low acid secretion showed greater metabolic acidosis when considered as a group. In patients studied several mo. or yr. after gastric resection a normal metabolic alkalotic response occurred in 3 where food passed into the duodenum, whereas metabolic acidosis was common in a group treated by Polya gastrectomy and, in 2 subjects with the most marked effect, symptoms of dumping syndrome occurred. In 2 subjects undergoing reconstructive surgery for postgastrectomy symptoms including dumping, the acidotic response was changed to an alkalotic response when food was diverted through the duodenum. These findings suggested that an abnormal metabolic acidotic response after gastric surgery may be due, at least in part, to the mechanics of gastric emptying. It is also suggested that the metabolic acidotic response to gastrectomy can persist for yr. after operatio and may bear a possible relationship to dumping,

10143 SERUM PROTEIN CHANGES AFTER GASTRECTOMY AS A MODEL OF ACUTE PHASE REACTION. (E.)

Werner, M. (Wilhelms U., Munster, Germany) and D. Odenthal. J. Lab. Clin. Med. 70(2): 302-310, 1967.

Changes in specific serum proteins were analyzed in 12 patients (10 men, 2 women; 36-72 yr. old) who underwent gastrectomy (7 had a Billroth I resection and 5 a Billroth II; 10 had gastric or duodenal ulcer, and 2 had gastric carcinoma) and who had an uneventful postoperative course. Serum samples were collected before and at 3-day intervals until the eighteenth postoperative day; individual proteins were estimated by radial immunodiffusion and enzymatic assay. The following temporary shifts in individual proteins accounted for changes in the electrophoretic pattern: Albumin conc. fell; α_1-globulins rose, due mostly to increased α_1-antitrypsin, and less to α_1-acid glycoprotein while α_1-lipoprotein simultaneously fell; α_2-globulins also rose, mostly due to increased haptoglobin, and much less to ceruloplasmin, while α_2-macroglobulin remained unchanged; β-globulins decreased, due to falling transferrin and β-lipoprotein. These changes corresponded to those observed in acute inflammatory disease. Gastrectomy offers the opportunity to study the acute phase reaction in a model under uniform conditions since the degree of injury is similar and the onset of the organism's reaction can be accurately timed.

HYPERGLYCEMIA AFTER GASTRECTOMY AS A
PREDIABETIC STATE. CLINICAL STUDY OF
OSTGASTRECTOMY PATIENTS. (E.) Tobe, T.
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:836-840, 1967.

se tolerance tests (Folin-Wu determinations)
performed on 100 postgastrectomy patients
certain the incidence and nature of oxy-
glycemia after gastrectomy. Pancreatic
mens were examined histologically and
iated with the glucose tolerance curve in
ses. A high incidence (41%) of oxyhyper-
nia with glycosuria was found after gastrec-
The incidence of oxyhyperglycemia varied with
ut not with the type of disease or method of
ry. In patients over 50 yr. of age, oxyhyper-
nia occurred in 50.7%, but in those under 50,
curred in only 20%. In those under 40 yr. of
no true oxyhyperglycemia occurred. Only 2
of questionable oxyhyperglycemia were ob
in those patients under 40 yr. of age. Hyper-
glucose soln. had the effect of releasing
nin and many patients complained of nausea or
cation in this series; in severe cases, it
oled the dumping syndrome. Thus, the glu-
colerance test after gastrectomy may be used
dumping syndrome test for vague abdominal
oms. Serum cholesterol or blood glucose
after taking the usual carbohydrate meal
ients with oxyhyperglycemia and glycosuria
most normal and differentiable from the
in diabetic patients. Histological find-
n the pancreas of older patients whose
rative glucose tolerance test curves were
al frequently revealed degranulation or
ization in the β-cells of the islets of
hans. In this series, 2 patients, whose
e tolerance test curves showed oxyhyper-
ia preoperatively, developed a diabetic
n 3 mo. and 10 mo. afterward, resp. Five
ts who had a family history of diabetes
abnormal glucose tolerance test curves
eratively. It is concluded that patients
family history of diabetes and those over
of age should be followed as prediabetics.

THE IMPORTANCE OF PRESERVING OPERATIVE
PROCEDURES ON THE STOMACH. (Rus.)
nikov, V. A. (Sverdlovsk Med. Inst., USSR)
K. Kurchavov. Vestn. Khir. Grekov 98(4):
1967.

numan and 20 canine organ complexes a large
ility was found in the branching of both
of the vagus nerve and its interrelation
he elements of the sympathetic nervous
. Twenty of 30 dogs had surgery by Bill-
with Hoffmeister-Finsterer modification
had Billroth 1 with preservation of both
and organic branches of the vagus nerves.
15 patients had establishment of gastro-
l anastomosis; a resection line was marked,
to this line up to the anterior part of
odenum all the vessels entering the anterior and posterior gastric wall at a distance of 1.0-1.5 cm from the small curvature were sutured by silk; peripheral ends at a distance of 1.5 cm from first line sutures were also ligated; then the gastric serous-muscular path with adjoining descending branches of the left gastric artery, basic trunks of the anterior and posterior cord of vagus nerve and their multiple organic branches passing in the small omentum, was isolated. After duodenal resection, the stomach was resected and gastroduodenal anastomosis established; the end of the path was sutured and the latter fixed lengthwise to the small gastric curvature. This method completely preserved both cords of the vagus nerve with multiple interorganic branches and even perivascular nerve plexus, and with a gastroduodenal anastomosis nutritional masses, passing through the duodenum, caused suitable reflexes with its mucous membrane, necessary for the liver and pancreas. Postsurgical course in dogs with this gastric resection was smoother than in dogs with typical gastric resection, which refused food, vomited, lost wt. and had fluid stools. One clinical case history of successful use of this method is presented in detail. Such method could be used at any localization of ulcerative process and at complications of peptic ulcers (hemorrhage, perforation, stenosis); however, its use should be specially studied in ulcers of the lesser curvature due to the possibility of their malignant transformation, as well as for duodenal ulcers located lower.

10146 CANCER OF THE STOMACH. (E.)
Veidenheimer, M. C. and C. J. H. Logan.
Surg. Clin. N. Amer. 47(3):621-626, 1967.

During the 10-yr. period from June, 1948-May, 1958, 687 patients (447 men, 240 women; av. age 59.7 yr.) with previously untreated malignant disease of the stomach were treated at the Lahey Clinic Foundation with a followup rate of 99.3%. Initial complaints of this group varied greatly, but wt. loss, anorexia and indigestion was most common; some had vomiting and hematemesis or melena; 66% had a wt. loss of more than 10 pounds, and 34% lost more than 20 pounds. Forty-two % of the patients had symptoms for longer than 6 mo., and 82% had symptoms for less than 1 yr. Physical examination revealed normal findings in 492 (71.6%); a palpable mass or clinical evidence of metastatic disease was present in 28.4%. Studies of gastric acidity performed on 308 patients revealed that 50% had a level of acidity that was either normal or above normal. X-ray study resulted in a correct diagnosis in 87.1% of the patients examined; an additional 6.2% of the patients examined were believed by radiologists to have a lesion highly suspicious of cancer; incorrect radiologic diagnosis was made on only 6.7% of the entire series. Resection of the stomach was possible in 407 patients (59.4%); of the remaining 278, 181 had biopsy alone, 58 had laparotomy without biopsy, 26 had a simple gastroenterostomy, 1 had a gastrostomy, and in 12, other various nonresective procedures were done. Gastric resection was palliative in 148, and thus there were 259 patients on whom resective surgery was performed with hope of cure. There were 13 basic pathologic types of tumor found, the most common being carcinoma simplex, found in 268 and adenocarcinoma, found in 247. Site of the gastric carcinoma was in the antrum in 204 (30.1%), lesser curvature in 164 (23.9%), greater curvature in 56 (8.2%), cardia in 173 (25.2%), entire stomach in 62 (9.0%) and unspecified in 23 (3.3%). A total of 255 patients (51.7%) presented positive evidence of lymph node metastases; 125 (18.2%) displayed no evidence of lymph node involvement. The remaining 207 patients (30.1%) did not have definite evidence of either involvement or absence of involvement of lymph nodes at time of surgery. Operative mortality for 100 patients undergoing total gastrectomy was 9%, and that for 307 undergoing subtotal gastrectomy was 3.9%; for the entire group of 407 patients, it was 6.9%. For the 407 patients undergoing resections, the 5-yr. survival rate was 23.1% and the 10-yr. survival rate was 13.3%. For those undergoing resection with hope of cure the 5-yr. survival rate was 36.2%, and the 10-yr. survival rate was 18.5%. When survival was related to lymph node involvement, the 5-yr. survival rate was 7.6% and the 10-yr. survival rate, 0.8%, for those with lymph node involvement, and the 5-yr. and 10-yr. survival rates were 47.3 and 18.4%, resp., for those without lymph node involvement. Absolute survival of the 687 patients with cancer of the stomach revealed that 5-yr. survival (684 cases) was 13.7% (94) and the 10-yr. survival (445 cases) was 6.5% (29).

10147 SURGICAL TREATMENT OF CANCER IN THE PROXIMAL PORTION OF THE STOMACH.

(Rus.) Peterson, B. E. (Cent. Inst. Postgrad. Med., Moscow) and K. Zh. Musul'manbekov. *Vestn. Akad. Med. Nauk SSSR* 22(5):48-55, 1967.

Postsurgical mortality of cardial cancer according to the latest literature (1959-65) av. 15-20% (range 3.2-39.9%) while the cases studied here of 140 patients in 1966 av. 22.9%. In the last 6-yr. period, of 291 patients (226 males, 65 females) treated for cancer of the proximal part of the stomach, 229 had surgery (e.g. gastrectomy or cardial resection in 140 (age 20 - over 70 yr.), pallative surgery in 38 and exploratory thoracotomy and laparotomy in 51, part of whom had subsequent chemotherapy, while the remaining patients were treated by therapeutic compounds. Lethal outcome following surgery occurred in 32 of 140, 4 of 38 and 1 of 51, resp. Seven of 140 were operated in Stage 2 of the disease and the remaining in Stages 3-4; in 103 surgery was performed in those older than 50 yr. Tumor transition to the esophagus was found in all patients with cardio-esophageal cancer, in 35 with subcardial cancer and in 2 of 8 with fundal cancer. Of 122 with subcardial cancer surgery could be performed in 54 (resection of the proximal part
in 16 and gastrectomy in 38); of 99 with card
esophageal cancer 78 had surgery (e.g. 56 and
resp.), while 8 with fundal cancer had gastre
tomy. Resection of the proximal part of the
stomach by thoracic access had 45 (6 dead) by
abdominal access 19 (3), and by combined acce
6 (2); the resp. values for gastrectomy are 2
(6), 35 (9), and 11 (6). Surgery was combine
in 63 cases. Death was due to faulty sutures
anastomoses in 10 (death occurred by day 2-30
after surgery), pulmonary-pleural complicatio
in 6, purulent complications in 4, internal a
adrenal hemorrhages, 3, cardiovascular compli
tions, jejunal loop gangrene, insufficiency o
gastric stump and organic wall at the site of
fixation to the diaphragm, 2 each, shock,
thromboembolism of the pulmonary arteries, ac
pancreatitis, 1 each. Bypass anastomosis in
patients resulted in 1 death from faulty sutu
During 1964-66, 7 of 55 operated patients die
(12.7%); this decrease was mostly due to more
careful preparation of the patients for surge
standardization of the surgical technics and
more rational post-surgical supervision of
patients. Esophageal resection of 10 cm or
is recommended.

10148 MOTOR FUNCTION OF THE STOMACH FOLL
RESECTION OF ITS CARDIAL PORTION I
CONNECTION WITH CANCER.

(Rus.) Zheleznyi,
(Nagatinsk Line Hosp. for Moscow-Oksino-Volga
Water Transport Workers, USSR) and S. S. Mor
Sovet. Med. 29(12):26-30, 1966.

The motor function of the stomach (rhythm of
biopotential fluctuation, max. and minimum
potential, potential difference, av. biopote
was studied in 30 patients 10 days-16 yr. af
cardiectomy for cancer of the proximal porti
of the stomach and in 10 persons without dis
of the gastrointestinal tract; radiology and
electro-gastrograms were employed in this st
Up to 30 days after resection, the motor act
of the gastric stump was markedly disturbed,
showing a decreased value for all components
especially of rhythm (2.1 fluctuations/min.,
compared to the normal of 3 fluctuations/min
A further decrease of all electro-gastrogram
indices occurred in the period from 1-6 mo.
after surgery, and it was conditioned by a
depression of motor activity and abatement o
postsurgical inflammatory symptoms in the st
wall; X-ray revealed atony of the stump,
peristalsis of the wall was inert, and evacu
from the stump was passive. Some improvemen
motor activity of the gastric stump was evid
6-18 mo. after surgery and was manifested by
increase of electrogastrogram indices; gastr
evacuation was more delayed. Electrogastrog
indices showed further increase during 1.5-5
yr. after surgery, and approached normal in
of the cases; however, fluctuation rhythm wa
still delayed. X-ray showed peristalsis of
gastric wall, and evacuation was somewhat
delayed. At observation more than 5 yr. aft
surgery, a further restoration of gastric mo

ity was noted, and in some patients, the
ces were normal. Therefore a marked decrease
tor function of the stump was evident at an
stage after resection; improvement began
o. after operation, but normalization
red much later. Vagus regeneration was
ed in 16 persons who died 2 mo.-16 yr. after
ry; regeneration had already occurred 6-7
fter surgery, while a pronounced regeneration
oted much later (10 yr.).

COPPER METABOLISM IN DOGS AFTER
GASTRECTOMY AND RESECTIONS OF VARIOUS
NTS OF THE STOMACH. (Rus.) Kovtuniak,
(Ivano-Frankovsky Med. Inst., USSR). Biull.
Biol. Med. 63(6):37-40, 1967.

study was made on 7 dogs after gastrectomy
establishment of esophagojejunoanastomosis
p 1), on 7 animals after resection of the
oduodenal portion of the stomach according
e Billroth II technic (Group 2) and on 7
after segmental resection of the body of the
ch (Group 3), while 6 dogs served as con-
after laparotomy. Progressive wt. loss
a lethal outcome occurred toward the end of
-9 mo. in Group 1 and after 10-12 mo. in
2, but dogs in Group 3 showed less wt. loss
urvived more than 2 yr. In controls, whole
and blood ultrafiltrate content of Cu before
fter surgery remained practically unchanged,
95 and 41 µg%, resp., while the Cu content
gans and tissues was the same as in healthy
ls. In Group 1, Cu content in whole blood
lood ultrafiltrate before surgery was 102
0 µg%, resp., while after surgery, whole
content decreased to 65 µg%, and that of
lood ultrafiltrate in the first 2 mo.
ased to 136 µg% with a subsequent decrease
ing, in the terminal period, twice the lower
which prevailed before surgery. In contrast
ntrols, a marked decrease in the Cu level
ound in the spongiosa substance of the
opoietic portion of the osseous epiphyses,
, liver, pancreas, kidneys and muscles. In
2, Cu content of whole blood by 10-30
after surgery remained practically unchanged,
hat of the blood ultrafiltrate was decreased;
the second mo. onward, Cu content showed a
lel increase in whole blood and blood ultra-
ate, while the latter decreased, in the
al stages, approaching initial levels; the
tent in previously-mentioned organs and
es was markedly decreased. In Group 3, Cu
in whole blood and blood ultrafiltrate
ed unchanged 8-9 mo. after surgery, while
9-10 mo. and for 2 yr. its content in both
lly increased. Cu conc. in organs and
es was the same as in controls.

THE ROLE OF THE NERVOUS SYSTEM IN THE
PATHOGENESIS OF THE DUMPING SYNDROME.
Silver, D. (Duke U. Med. Ctr., Durham,
, D. Rignault and F. H. McGregor, Jr.
y 62(1):148-154, 1967.

Healthy mongrel dogs (6), not previously operated upon, received an intrajejunal dumping challenge of 150 ml of 50% glucose; 5-20 min. after challenge, portal blood was obtained and 220 ml of each of the resulting plasmas was admin. i.v. into a recipient animal; 2 of the recipients dumped, 2 exhibited only 3-4 of the dumping changes and 2 had no response. It is concluded that dumping signs could be produced by transfusion of plasma alone. The responses of 12 dogs with innervated blind jejunocutaneous fistulas to a dumping challenge were compared to responses of 12 dogs with denervated blind jejunocutaneous fistulas; each of the innervated dogs was challenged 6 times and had a dumping syndrome each time; each of the denervated animals was challenged 3 times, and none of these exhibited any signs of dumping. Twenty-three dogs with previously prepared innervated blind jejunal fistulas or Roux-en-Y jejunal fistulas were subjected to a variety of nerve interrupting procedures; all exhibited dumping before denervation. Vagotomy (8 dogs), bilateral splanchnicectomy (4 dogs), bilateral splanchnicectomy and extensive bilateral abdominal sympathectomy (2 dogs), and vagotomy and splanchnicectomy (4 dogs) had no effect on the response to a dumping challenge. Vagotomy, bilateral splanchnicectomy and extensive abdominal sympathectomy delayed onset of the standard dumping response by 20 min. Three dogs underwent chordotomy at the C_7 level and vagotomy; none had more than 2 dumping signs and these were delayed in appearance to 30-75 min. A conditioned dumping syndrome, observed in 2 animals with innervated blind jejunocutaneous fistulas, suggested the cerebral cortex plays a role in the dumping syndrome. Alterations in serotonin conc. after a dumping challenge revealed that dumpers (innervated) and nondumpers (denervated) had similar changes in serotonin conc., indicating that serotinin was not responsible for the dumping signs. The results of these experiments do not confirm the presence of a transferrable humoral agent in the dumping syndrome and suggest that, while the importance of humoral agents in their roles as neurotransmitters is not discounted, the nervous system has the major role in the dumping syndrome.

10151 JEJUNOSTOMY IN THE HIGH RISK GASTRECTOMY PATIENT. (E.) Rogers, J. C. T. (Carle Mem. Hosp., Urbana, Ill.). Surg. Gynec. Obstet. 125(2):333-336, 1967.

High jejunal tube enterostomy for gastric decompression was performed in 36 partially gastrectomized patients (24 males, 12 females; 30-81 yr. old, with 20 being between 50-69 yr. old), most of whom were in the increased risk category (risk factors generally referable to the respiratory tract). Seventeen of the 36 patients had chronic duodenal ulcers with such diverse complications as obstruction, bleeding intractability and chronic perforation; 1 had an acute perforation. Ten patients had gastric ulcerations including those with chronic perforation, bleeding and chronic ulceration. Of 3 with bleeding gastric ulcers, 2 were due to steroid therapy in patients with arthritis. Three patients had hypertrophic gastritis, 3 carcinoma, 1 fibroxanthoma, and 1 a gastrojejunal ulcer. There were no deaths, and other than 2 superficial staphylococcal skin infections, there were no immediate or late untoward sequelae. This type of jejunostomy for decompression circumvents the nasopharyngeal, esophageal and epiglottic trauma and the possible complications attendant to the inlying nasogastric tube. The psychic trauma factor is absent, so that sedation is minimized in many patients. Ambulation is easy, and throat irritation and dysphagia do not occur. The jejunostomy tube may remain in place as long as necessary without fear of complications; therefore repeated intubations are unnecessary. The tube, as placed in the efferent jejunal limb of the gastroenterostomy, may play a part in the prevention of kinking and dysfunction. The jejunostomy tube being in the dependent portion of the stomach makes simple gravity drainage effective. The operative procedure is simple.

10152 PYLOROJEJUNOSTOMY. (E.) Pecora, D. V. (VA Hosp., Altoona, Pa.). Amer. Surg. 33(9):737-738, 1967.

The technic of pylorojejunostomy was used in 26 patients with benign peptic ulcer; with this method, a loop of jejunum is anastomosed to the pylorus in an isoperistaltic manner. There was no morbidity or mortality due to the technic. All patients were carefully followed for up to 18 mo.; gastrointestinal radiology indicated that function was at least as good as that after successful pyloroplasty. Repeated determinations of 12-hr. excretion of free acid showed that these patients were consistently achlorhydric. All patients maintained good nutrition and were able to take regular diets; there were no recurrences of ulceration or bleeding, and none had symptoms suggestive of dumping. This preliminary experience with pylorojejunostomy indicates that it is safe and offers the advantages of pyloroplasty in cases in which scarring tends to interfere with safe construction. This procedure also allows the use of the incised jejunum as a pyloric patch. The disadvantages of gastroenterostomy are avoided, since only the most distal portion of the stomach is exposed to alkaline secretions. Gastrointestinal radiography also has shown that the gastric contents appear to follow a relatively normal course through the pylorus, duodenum and jejunum.

10153 THE REVISED COMBINED OPERATION WITH SELECTIVE GASTRIC VAGOTOMY. (E.) Harkins, H. N. (U. Washington Sch. Med., Seattle), C. A. Griffith and L. M. Nyhus. Amer. Surg. 33(7):510-513, 1967.

The results obtained from 212 patients who w
vagotomized by a selective technic which cau
the stomach to be vagotomized while the extr
gastric branches were spared, indicate that
technic is preferable to the standard tranca
technic. A relative looseness or frequency
postoperative intestinal movements (without
dumping symptoms) occurred in 38% of 60 pati
treated by the combined operation of antrect
plus trancal vagotomy plus gastroduodenal
anastomosis as opposed to only 2% of 52 pati
treated by the same operations except that t
vagotomy was a selective gastric one. In
addition, serious intractable postoperative
diarrhea occurred (without concomitant dumpi
in 4% of the truncal vagotomy cases as oppos
to 0% of the selective operations. There wa
only 1 recurrent ulcer. The incidence of po
tive Hollander tests in the 76 cases subject
to the test was 8%, indicating that the stom
is generally completely vagotomized by this
technic. There were 3 deaths: 2 of these (
and 73 yr. old) had acute massive hemorrhage
an indication for emergency operations.
Furthermore, the third, (a 35-yr.-old man),
a history of 2 incidents of massive hemorrha
The procedure concomitant with the selective
vagotomy was antrectomy plus Billroth I in 1
cases, pyloroplasty in 95 cases and none in
cases.

10154 TRANSILLUMINATED DISTENTION GASTRO
TOMY: A PRELIMINARY REPORT OF A
SIMPLIFIED METHOD EMPLOYING AN ILLUMINATED G
TRIC CATHETER. (E.) Edlich, R. F. (U.
Minnesota Med. Sch., Minneapolis), M. V. Pre
M. S. Tsung, W. P. Ritchie, Jr. and O. H.
Wangensteen. Surgery 62(3):448-451, 1967.

An illuminated trocar gastrostomy technic is
described; it is easily performed and quickl
carried out, and was performed over a 2-yr.
period upon 18 dogs without morbidity or dea
The operative time for the procedure was
uniformly less than 15 min., and every anima
accepted fluid through the gastrostomy tube
within a few days with no evidence of extra-
vasation of fluid into the peritoneal cavity
After catheter removal, the gastrostomy site
was obliterated within 14 days. The simplic
and attractiveness of this technic reside i
circumstance that ready access to the anteri
wall of the stomach can be gained through a
small, subcostal incision; inflation of the
stomach with air brings the anterior stomach
wall into direct contact with the parietal p
neum. This method appears to be adaptable t

10155 EXPERIMENTAL TROCAR GASTROSTOMY.
Jascalevich, M. E. (New Jersey Col
Med., Jersey City). Surgery 62(3):452-453,

A new technic for gastric aspiration or alim
tion which consists of a nonlaparotomic, rap

rcutaneous, trocar gastrostomy is described,
sed upon experiments on 25 dogs. A Levin tube
passed p.o. and the stomach forcefully ex-
nded by several strokes of the inflator; in its
lated form, the stomach is brought beneath the
vel of the costal margin and, displacing the
lon downwards, is placed near anterior abdominal
rietes, without any other visceral inter-
sition; tympanism to percussion confirms the
derlying presence of the dilated stomach.
er this area, high and flush to the costal
rgin, a point incision is placed through the
n only, and the trocar (modified Hurwitz, in
s series) is carried into the stomach by a
gle rapid stroke. A catheter is passed through
sheath of the trocar, the balloon of the
vin tube is inflated and the sheath withdrawn.
catheter is pulled out tight in order to
ng the anterior gastric wall against the
erior parietal peritoneum. Percutaneous
nsgastric tube suction or feeding can be
rted immediately. This technic was con-
tently successful in establishing a gastro-
ma in all 25 dogs operated upon. On explora-
y laparotomy, which was done systematically
er each catheter insertion, no injuries to
on, liver or other viscera were noted.
ragastric or intra-abdominal bleeding was
imal; this was probably due to the fact that
balloon of the tautly-pulled catheter
rted a hemostatic compression over the edges
the gastrostoma. Withdrawal of the tube
er deflation of its balloon was followed
sistently by the spontaneous closure of the
trocutaneous fistula after 24-48 hr. This
hnic was valuable for feeding large animals
the laboratory, and may have possible clinical
lications for the treatment of selected cases
in comatose patients after cerebrovascular
idents or severe head trauma and shock) in
ch an expeditious, nonoperative gastrostomy
desirable for feeding or suction purposes.

6 ISOTOPE UPTAKE AND SCANNING OF STOMACH
IN MAN WITH ^{99m}Tc-PERTECHNETATE. (E.)
den, R. McG. (Western Infirm., Glasgow,
tland), W. D. Alexander and I. Kennedy.
cet 1(7503):1305-1307, 1967.

2 subjects (28-69 yr.) 10 were volunteers
no evidence of alimentary disease; a 65-yr.-
woman had an incarcerated hiatus hernia with
greater part of the stomach lying in the
rax; a male had a total gastrectomy. All
fasted 10-12 hr. before scanning. A tracer
of 800 μc ^{99m}Tc-pertechnetate was inj. i.v.
the resulting radiation dose to stomach
thyroid being less than 0.2 rem. The
men was scanned in the anteroposterior
tion at intervals up to 1 hr. after the
er dose. Scans taking approx. 20 min. were
ined with a speed of 80 cm/min. and a line
ing of 0.5 cm. In all, the stomach was
rly displayed within 15 min. of isotope inj.
he patient with incarcerated hiatus hernia,
activity was localized mainly above the xiphisternum. Av. uptake (% dose) in controls at 6, 20 and 60 min., resp., were: 1.2 (range 0-2.5); 3.0 (0.4-5.5); 6.8 (2.4-11.4). One patient was scanned at intervals up to 130 min. The scans were repeated on a second occasion, when 500 mg of crushed potassium pertechnetate was given at 80 min. By 1 hr., the uptake was 4.7% dose; by 130 min., 6.7%. On the second occasion the 80-min. value was 3.6%; 45 min. after admin. of potassium pertechnetate (125 min.) gastric uptake had fallen to zero. Advantages of this scanning technic are stressed.

10157 GASTRIC ASPIRATION IN FIBER OPTIC ENDOSCOPY. (E.) Waye, J. D. (City Hosp. Ctr., Elmhurst, N. Y.), E. Pitman and K. Krueger. Amer. J. Dig. Dis. 12(7):705-707, 1967.

Nonemergency fiber optic gastroscopies (100) were performed with and without preceding gastric aspiration. All patients underwent gastroscopy with the Hirschowitz fiber optic gastroduodenoscope (Fiberscope), and many also underwent esophagoscopy with the LoPresti foroblique fiber optic esophagoscope. All patients were fasted for 12 hr. before examination. Of the first 50 patients studied, alternate patients had gastric aspiration with the Ewald tube after pharyngeal anesthetization; the av. vol of aspirate was 20 ml, with a range of 0-45 ml. The remaining 25 patients had gastroscopy without prior gastric aspiration. No difference was evident in ease of visualization between the groups with and without aspiration; it was found that a clear image could always be obtained by judicious instillation of air coupled with positional changes. None of the 25 patients who did not undergo aspiration required removal of the gastroscope and subsequent aspiration of gastric contents. Based on this initial experience, the next 50 consecutive patients underwent gastroscopy without preceding gastric aspiration; of these 50 patients, only 1 had unsatisfactory gastroscopy due to the presence of fluid and required subsequent gastric aspiration. Gastric juice in the amount of 120 ml was obtained, after which successful gastroscopy was performed; this patient was subsequently found to have pyloric obstruction secondary to active duodenal ulcer disease. It is suggested that pre-endoscopic gastric emptying is of little value in nonemergency procedures.

10158 EXPERIMENTAL STUDY OF THE PATHOGENESIS OF CONGENITAL HYPERTROPHIC PYLORIC STENOSIS IN PUPPIES. (E.) Mishalany, H. (American U. Hosp., Beirut). J. Pediat. Surg. 2(3):212-214, 1967.

In the present study a partial obstruction of the pyloric outlet (at the level of the pyloric sphincter) was created to determine whether or not a pyloric tumor is produced by work hypertrophy of the pyloric musculature proximal to

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the obstruction. Partial occlusions were created in 21 mongrel dogs between 1-9 wk. as these animals are known to develop congenital hypertrophic pyloric stenosis in much the same manner as humans. All dogs were fed milk postoperatively and were autopsied at varying times within the 7 postoperative wk. These animals were seen to have proximal dilatation and muscle hypertrophy of the pylorus, body and fundus of the stomach but no localized muscular hypertrophy of the pyloric canal in the form of tumor growth was seen, as might be expected from the application of the Lehman theory. The objection could be raised that the constricting suture was not present from the first day of life and so might not duplicate all the physiologic effects of pylorospasm. It was assumed, however, that a 1-day-old muscle would not behave so differently from a 1-mo.-old muscle under the same conditions of stimulus. The results of this study do not support Lehman's theory of the pathogenesis of congenital hypertrophic pyloric stenosis.

10159 RELATIONSHIP BETWEEN ASPIRIN TAKING AND GASTRODUODENAL HAEMORRHAGE. (E.) Parry, D. J. (West Middlesex Hosp., Isleworth, England) and P. H. N. Wood. Gut 8(3):301-307, 1967.

Of 542 patients without overt hemorrhage, 32% had a history of aspirin ingestion during the wk. prior to hospital admission, while 69% of the patients admitted with evident hemorrhage did have a positive history of aspirin intake. The times of aspirin ingestion and the frequency were similar in both hemorrhagic and nonhemorrhagic patients. Of the 95 patients with major hemorrhage, 15 had conditions encountered only infrequently (carcinoma of the stomach, hiatus hernia), 6 had negative histories and 9 had other conditions. Negative history of aspirin intake was noted in 22 of the 45 with proven peptic ulcer. In studies of possible aspirin-induced occult hemorrhage, no significant difference in susceptibility was observed in comparing patients with either active peptic ulcer or with recent hemorrhage with patients demonstrating normal gastrointestinal tracts. Although aspirin ingestion can be linked with the development of overt hemorrhage, no definite relationship can be offered at this time. It is concluded that patients without identifiable gastrointestinal pathology have the greatest risk from aspirin ingestion.

10160 CHRONIC GASTRITIS IN CHILDHOOD. (E.) Sedláčková, M. (Charles U., Prague) and B. Bednář. Gastroenterologia (Basel) 107(4):251-258, 1967.

Biopsy of the gastric mucosa was obtained from 131 children who were 2-18 yr. old. These 131 children were divided into 3 groups: Group 1, 54 without any gastrointestinal complaints; Group 2, 40 with abdominal pains, in whom the usual clinical examinations did not detect any organic cause of their disorders; and Group 3, 37 whose abdominal pains were explained clinically (duodenal ulcer, pathological, parasitolo ical, and bacteriological findings, cholecystopathy, abdominal epilepsy, and others). Chroni gastritis was found in 36 (28%) of the entire group. In Group 1, 13 (24%) of 54, in Group 2, 14 (35%) of 40 and in Group 3, 9 (24.4%) of 37 children had chronic gastritis, resp. The highest percentage of chronic gastritis was found in children 15 yr. of age (50%); in these children, advanced histological changes of the gastric mucosa were found. It is suggested th chronic gastritis originates long before adulthood, e.g., in childhood, and may have an asymptomatic course.

10161 ARGENTAFFIN CELLS IN EXPERIMENTAL GASTRITIS. (Sp.) Rodriguez Olleros A. (U. Puerto Rico, San Juan) and R. Barroso Moguel. Bol. Asoc. Med. P. Rico 59(6):243-246 1967.

The number and distribution of argentaffin cel in the gastric mucosa were studied (modified Rios-Ortega method) in 3 groups of animals wit experimentally-induced gastritis. Atrophic gastritis was produced in rabbits of Group 1 b desensitization with antigens from human gastr juice (12 mg in saline) admin. twice a wk. for 12 wk.; the number of argentaffin cells in the animals was markedly diminished as compared tc the number observed in rabbits with normal gastric mucosa. Papillomatous gastritis was induced in rabbits of Group 2 by inj. of 1-1. ml of a 0.5% alcohol-ether soln. of croton oi twice a wk. for 6-9 wk.; the number of argenta cells in these animals was markedly increased compared to controls during the early necroti stage, while the cells were displaced from th twelfth inj. or during the papilloma-formatio stage. Erosive gastritis was induced in dogs Group 3 by the weekly admin. of 2 g of cincho (Atophan) (duration of experiment not specifi no argentaffin cells were present in these animals during the necrotic stage accompanied by edema and metaplasia of the mucosa. The possible role of local production of serotoni by the argentaffine cells of the gastric muco in the development and symptomatology of gast tis is discussed.

10162 WEIGHT OF THE HUMAN STOMACH. (Rus. Klein, E. G. (Kiev Province Bureau Forensic Med., USSR) and A. Ia. Krishtul. Ar Pat. 29(4):53-58, 1967.

Human cadavers (age up to 1 yr. in 69 cases, 2-19 yr. in 101, 20-100 yr. in 232, embryos 5 mo. in 14) without gastric pathology (died suddenly of trauma with rapid death) were studied. Stomach wt. in male embryos was 0.6 at 5 mo., 0.9 at 6 mo., 2.5 at 7-8 mo., and 3 at 10 mo. In boy and girl newborns it was 4. and 4.4, resp.; at age 1-12 mo. it varied bet

-32.9 and 10.0-22.0, resp.; at age 2-10 yr.,
een 38.3-83.0 and 38.3-75.0, resp., at age
9 yr., between 71.2-180.0 and 82.5-160.0,
; in male and female adults, age 20-49 yr. it
ed between 153.3-160.0 and 142.5-149.5,
.; at age 50-89 yr. between 125.0-160.2 and
0-146.7, resp.; and in 7 females age 90-101,
as 105.7. Stomach wt. increase was irregular
was always lower in females than in males.
ease in organ mass was pronounced in the
t yr. after birth. Toward 20 yr. of age
ach wt. in males reached 160 g, e.g., it
eased 37.2 times since birth. Senile stomach
phy appeared in males at age 80-89 yr., and
ach wt. reached an av. of 125 g; in females
le stomach atrophy appeared 10 yr. earlier
the wt. was 124.6 g. In senile atrophy of
ach and signs of senile cachexia, stomach wt.
ingle cases decreased to 70 g. Direct
tive correlation between stomach wt. and body
was found in most of the age groups (correla-
coefficient varied between 0.6-1).

3 GASTRIC SHIGELLOSIS IN RHESUS MONKEYS.
(E.). Kent, T. H. (Walter Reed Army
. Res., Washington, D. C.), S. B. Formal,
. LaBrec, H. Sprinz and R. M. Maenza. Amer.
ath. 51(2):259-267, 1967.

us monkeys (20) were fed virulent Shigella
neri organisms and the stomachs were examined
,3,4,7 and 8 days after challenge. Grossly,
st 50%, and microscopically more than 66%
he animals had gastric lesions as early as 2
after challenge. The lesions were most
re at 3-4 days, but they persisted to 8 days.
0 animals, 16 had gastric lesions while 19
colonic lesions of shigellosis. In Giemsa-
ned sections large bacilli were demonstrated
he lesions. The fluorescent antibody technic
ifically identified these bacteria as
ella. S. flexneri was cultured from the
achs of 13 of 16 animals with gastric lesions.
e appeared to be no relationship between pH
astric contents and the occurrence of gastric
ons or the recovery of Shigella organisms
gastric contents.

BIOELECTRICAL ACTIVITY IN GASTRIC
BRANCHES OF THE VAGUS IN BROWN-PEARCE
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n-Pearce sarcoma was induced by 0.2-0.4 ml
umor suspension admin. 12-14 days earlier
the anterior wall of the antral part of
it stomachs. In controls, electrical
vity (afferent impulse activity) in the
cated vagus nerve branch was 31 impulses/sec.
an amplitude of 7-20 μvolts; during
ulation of the gastric mucous membrane by
soln. of HCl and 1% caffeine soln. (2-3 ml
astric intubation) the frequency and amplitude
he potentials increased in 10 of 11 experiments.
In tumor-bearing rabbits initial activity was divided into 3 types. In 7 experiments initial activity was minimal, potential frequency did not exceed 10 impulses/sec. and their amplitude was hardly distinguishable from the noise of the intensifier; in 3 experiments the frequency of the impulses varied from 17-32 impulses/sec.; in 2 experiments the activity was 48 and 50 impulses/sec., resp. The av. frequency of impulse/sec. was 15 in tumor-bearing rabbits. Stimulation of electrical activity following admin. of HCl and caffeine was found in only 6 of 12 experiments, 4 of which had low initial activity. In these observations of innervation of the gastric body and part of the fundus, initial impulsation exceeded that in nerves leaving the region affected by the tumor. Afferent impulsation depended on the tumor size, e.g., at tumor diameter up to 1.5 cm (7 rabbits) frequency of impulses/sec. were 24 and at av. tumor diameter from 1.6-3.0 cm (5 rabbits) the frequency was 5.

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Sera from 29 patients with pernicious anemia were studied by indirect immunofluorescence for the presence of antibodies against the cytoplasm of parietal gastric cells. The formation of these antibodies is related to the occurrence of histologically diagnosed chronic atrophic gastritis; this correlation is even more pronounced if the gastritis is accompanied by pernicious anemia. The control group consisted of 15 individuals with normal or increased gastric secretion. Sections of gastric mucosa, removed by surgery from patients with duodenal ulcers, served as antigen. The sections were treated at room temperature for 30 min. with the human serum and then with fluorescein isothiocyanate-labeled goat or swine serum against human γ-globulin. To increase the contrast, the sections were subsequently stained by Evans blue. Antibodies against cytoplasmic parietal cells were detected in sera of 24 patients (82.7%) with pernicious anemia; in sera collected from individuals of the control group the antigen were not detected. Demonstration of these antigens can be used as a complementary diagnostic test for the detection of chronic atrophic gastritis in the early phase of the disease.

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A new type of intraoperative gastroviewer is described which gives an increased and fuller view of superficial carcinoma and its margins than heretofore. The instrument consists of a sophisticated tube with a lens system that permits a 60° angle view of the mucosa. Strong light made by a lamp within the gastroviewer is conducted by glass fibers to the scope and into the stomach. Through an opening by gastrotomy, the polyethylene guide (gastroslip) is first inserted, and the surrounding tissue is tightly tied with silk thread, thereby preventing oozing of blood from the open wound and leakage of inflating air. The scope is then inserted through the guide tube, and air is pumped into the stomach to distend it. Because of the wide range of view and strong lighting, the mucosal lining can be visualized clearly and the lesion studied in detail. The extent of the carcinoma is carefully studied; by probing, the surgeon can determine the farthest margin of the lesion and mark it with a hemostatic clamp. Gastrectomy is then performed at a cutting line at least 2 cm proximal to this margin, and thus there is little likelihood of leaving any cancerous tissue in the gastric remnant. This instrument is also useful in detecting multiple lesions; often only the major lesion has been found by conventional methods and the minor lesions overlooked; however, with this instrument, the mucosal lining can be quickly and accurately examined for other smaller but vital lesions. This instrument is particularly valuable in surgery for superficial carcinoma.

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omoses between ileocolic artery branches and
l small intestine arteries are the main
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olic artery and sometimes the distal small
tine arteries. In a study on 107 abdominal
ies of adult cadavers anastomoses were absent
9%, while single anastomoses were found in
, double in 50.5%, and triple in 17.7%.
anastomosis diameter was 0.1-0.4 cm, and
h 7-14 cm. Anastomosis supplied the terminal
of the ileum at the length of 10-70 cm, most
15-35 cm. First-order arcades were found
.7%, 2 in 30.9%, 3 in 7.5% and none in 14.9%.
variants of branching of vessels in the re-
of anastomosis are: (1) simple variant (16%)
to the paracolic bed of large intestine,
straight arteries and sometimes several small
es of first order; (2) variant of more com-
ted structure (27.7%), arcades of first order
ocated in the left half or somewhat closer
e ileocecal angle, sometimes second order
es were possible; a straight artery, outgoing
the last arcade approached the mesenteric end
e ileum, was reduced in diameter, and entered
all of the ileocecal angle or combined with
ast cecal artery; (3) complicated variant,
order arcades were located at the lower
hery of the anastomosis close to the ileo-
angle, there could also be arcades of second
hird order; in 50%, vessels bunch out in a
nal direction toward the cecum and ileum,
e remaining part the last straight artery
ed the ileocecal angle (56.6%). Resection
eocolic artery 2.5-6.5 cm from the ileocecal
e is recommended; for necessary mobilization
larger segment of ileum, resection could be
-2 small intestinal arteries at 7-14 cm of
th anastomosis or 15-35 cm length of intestine;
n resection should be no closer than 10-15 cm
the ileocecal angle. Venous anastomoses do
always correspond to the arterial ones.

9 INTESTINAL CYTOCHROME RESPONSE WITH
REPAIR OF IRON DEFICIENCY. (E.)
man, P. R. (Stanford U. Sch. Med., Palo Alto,
f.), P. Sunshine and Y. Leonard. Pediatrics
):863-871, 1967.

nal biopsies were obtained from 5 infant
ents by means of a Rubin tube passed with
roscopic monitoring, 24-32 hr. after an i.m.
of Fe-dextran. A higher cytochrome-oxidase
vity existed in newly produced cells at the
of the villus than in older cells which had
formed during a state of Fe deficiency.
lar phenomena have been described in the rat,
esting that the repair of intestinal cyto-
me oxidase activity is limited by the rate
ell proliferation. Colchicine, by arresting
cell division at metaphase, has been shown experimentally to interfere with cytochrome-oxidase repair when given along with Fe-dextran. Aspartate-transcarbamylase, alkaline phosphatase, sucrase and maltase, all enzymes not containing Fe or requiring it as a cofactor, showed normal activity in intestinal mucosa of the Fe-deficient rat. Intestinal malfunction was ruled out in such rats by determination of fecal-fat excretion, ^{131}I polyvinylpyrrolidone excretion as well as by the transport of glucose and galactose in everted sacs of the jejunum and ileum.

10260 ENZYMATIC ACTIVITY OF THE SMALL INTESTINE IN CHRONIC NONSPECIFIC ENTEROPATHIES. (Rum.) Fodor, O. (3rd Med. Clin., Cluj, Rumania), D. Dumitraşcu, G. Ciofu, I. Itu, S. Tragor, A. Nicoară, C. Calu and D. Grigoraş. Med. Intern. (Bucur.) 19(2):171-180, 1967.

In 70 patients with various common intestinal conditions (chronic enteritis, dyskinesia, and others) or previous stomach surgery, the enterokinase activity in the jejunal secretion av. 1827 ± 2067 Slighin U/cc and 2600 Slighin U/cc, resp., as compared to 180 ± 23 Slighin U/cc in 20 controls while the resp. alkaline phosphatase value were 34 ± 10 Bodansky U/cc and 41 ± 18 Bodansky U/cc as compared to 19 ± 8 Bodansky U/cc in controls. The av. alkaline phosphatase conc. in the fresh mucosa of patients with enteropathies or in those with stomach surgery were 6608 ± 8753 Bodansky U/cc and 7632 ± 10,097 Bodansky U/cc, resp., as compared to 4116 ± 2287 Bodansky U/cc in controls. In controls, the intestinal mucosa/intestinal juice alkaline phosphatase ratio was constant and av. 100 while in the patients studied the ratio varied greatly and av. 250 for patients with enteropathies and 200 for surgical cases. Agar-gel electrophoresis of the intestinal juice revealed 6 protein fractions, the only difference between patients and controls being in fraction V (70% and 82%, resp.). This fraction was located between the electrophoretic positions of serum α- and β-globulins, where both enterokinase and alkaline phosphatase are expected to be found. There was no relation between enzyme activity, pH, age of patient, or duration of disease. Enterokinase activity was lower in patients with diarrhea than in those without. Enzymatic activity in enteropathic patients seems to be higher than normal; however, the wide spread of the figures suggests that while digestion and intestinal absorption are correlated phenomena, they are capable of undergoing independent variations.

10261 MUCOSA OF THE SMALL INTESTINE IN PERNICIOUS ANEMIA. (E.) Foroozan, P. (VA Hosp., Madison, Wis.) and J. S. Trier. New Eng. J. Med. 277(11):553-559, 1967.

Peroral small intestinal biopsies (52), obtained serially from 8 anemic patients (5 men, 3 women; 55-83 yr. old; pretreatment hematocrit values ranged from 15-34%) with untreated pernicious anemia before and after vitamin B_{12} therapy were compared with 22 biopsies from 11 control subjects with normal hematocrit values and no known disease of the small intestine. Histologic survey revealed decreased mitosis in the crypts, shortening of villi, megaloblastosis and megalocytosis of epithelial cells and an increase in cellular elements of the lamina propria in pretreatment biopsies from all 8 patients with pernicious anemia. Quantitative evaluation of mitosis, epithelial surface length and epithelial cell nuclear size confirmed the histologic observations. After vitamin B_{12} treatment, mitosis increased rapidly to control levels. In contrast, epithelial surface length and nuclear size reverted more gradually to control levels. In contrast, epithelial surface length and nuclear size reverted more gradually to control levels. Two or more mo. after vitamin B_{12} admin., biopsies from all 8 patients were histologically indistinguishable from those of controls. Characteristic morphologic changes are thus consistently found in the mucosa of the small intestine of patients with pernicious anemia. These changes revert to normal after adequate vitamin B_{12} replacement and do not appear to cause significant clinical symptoms.

10262 ENTERITIS NECROTICANS IN UGANDA. (E.) Wright, D. H. (Makerere Univ. Coll., Kampala, Uganda) and J. P. Stanfield. *J. Pediat.* 71(2):264-268, 1967.

A report is presented of 15 cases of enteritis necroticans (nonepidemic form) among 15 children in Uganda; (mean age 4 yr., and ranging from 8 mo.-7 yr.). Male subjects predominated, 12 to 3; most were Baganda, but there were 3 from other tribes. Most cases were the acute toxic type, similar to those reported recently from New Guinea. In most cases, the illness began with mild fever and gastrointestinal symptoms, colicky central abdominal pain with vomiting and diarrhea, and later abdominal distention. After 2-3 days, the child's condition usually deteriorated rapidly with symptoms of shock and intestinal obstruction; terminally, there was often a rising temperature, increasing abdominal distention, jaundice and stupor. A neutrophilic leukocytosis was recorded in 3 and the hemoglobin level was below 7 g% in 3. Most appeared to have been well nourished. The gastrointestinal tract presented a striking and characteristic appearance with thickening and distention of the loops of the jejunum. In all cases, the mucosa of the esophagus, stomach, and first and second parts of the duodenum was normal. The mucosal lesion began abruptly either in the third part of the duodenum or the first few inches of the jejunum. The affected intestine had areas of necrosis extending for a variable distance through the wall; in 2 cases, only the superficial part of the mucosa was affected; the remainder showed deeper involvement, with necrosis extending into the muscle in 3 cases. In most cases the necrotic slough contained large numbers of ba
gram-positive cocci and gram-negative bacilli
ually predominated, but short gram-positive r
resembling *Clostridium welchii* were seen in 1
cases. Gas bubbles were observed in the intes
wall in 4 cases. *C. welchii* Type C was isolat
from the intestine and mesenteric lymph nodes
patients; 1 of these was Type A, 1 Type C and
untyped. *C. welchii* Type C was isolated from
patient who subsequently recovered. Only *Esc*
ichia coli was isolated from the intestine of
patients after death. The etiology of enteri
necroticans in Uganda is obscure; cases have
sporadic in occurrence and have not been asso
with any particular food or custom. *C. welch*
may play a role in the etiology of enteritis
necroticans in Uganda, although invasion of t
intestine with this organism may be a seconda
phenomenon rather than the primary cause of t
disease. Although it has been suggested that
ascariasis may be implicated, *Ascaris* infesta
tion was found at autopsy in only 1 of the 15
cases.

10263 TRAUMATIC INTRAMURAL HAEMATOMA OF T
DUODENUM. (E.) Webb, A. J. (Queen
Elizabeth Hosp., Birmingham, England) and J.
Taylor. *Brit. J. Surg.* 54(1):50-56, 1967.

A 10-yr.-old boy was admitted with a 2-day hi
of abdominal pain, frequent nonbilious vomiti
generalized rebound abdominal tenderness, gua
in the right hypochondrium, scanty intestinal
sounds and pelvic peritoneal irritation. Lap
omy was performed after discovery of a tender
above and to the right of the umbilicus; diag
was subserous intramural hematoma of the duod
Antibiotics, nasogastric suction, and i.v. fl
were given postoperatively, but this course w
troublesome. Large aspirations, accompanied
hypokalemia and hypochloremia, persisted for
wk. A Ba study 32 days postoperatively showe
some mural encroachment on the upper duodenal
lumen, with delay in gastric emptying. A 9-y
old boy complained of upper abdominal pain af
being hit lightly in the back by a car; after
2 days, abdominal pain increased and frequent
bilious vomiting began. At operation a norma
pendix was found with marked ileocecal and me
teric lymphadenopathy; some blood-stained per
neal fluid was found. A retroperitoneal hema
was found overlying the inferior vena cava an
third portion of the duodenum; this was an in
mural duodenal clot lying between the longitu
and circular muscle coats with a breached and
fragmented seromuscularis. Minimal retroperi
hematoma was present and no bleeding points w
found. The abdomen was closed with retroperi
neal drainage. Large bilious aspirates persi
postoperatively; he was discharged on day 21
was well 3 wk. later. The literature (5 pati
is reviewed, especially with regard to manage
Surgical intervention with evacuation of the
hematoma is preferred over conservative treatment.

4 INFANTILE PNEUMATOSIS INTESTINALIS. (E.)
Stone, H. H. (Emory U. Sch. Med., Atlanta,
. Bull. Emory Univ. Clin. 5(2):45-55, 1967.

matosis intestinalis of infancy apparently
lops as a consequence of bacterial invasion
ne intestinal wall; animal investigations and
view of all reported cases in infants yield
which support this theory. Due to a func-
al break in the mucosal barrier, bacteria
h the submucosal space; these bacteria propagate
gas collects in large cystic spaces. Because
n inadequate local blood supply, the gas
ot be absorbed as rapidly as it accumulates;
is then becomes overwhelming, and the child
, usually within a brief period of time. In
ns, the clinical course usually progresses
an episode of enterocolitis, through a stage
arked paralytic ileus, to a terminal state
is typical of either generalized sepsis or a
inating pneumonia. A successful therapeutic
men requires the admin. of effective anti-
ics and possibly the selective use of either
enal steroids or the hyperbaric O_2 chamber.
ensive, careful fluid and electrolyte therapy
necessary, in addition to all other supportive
sures.

65 NINETY-TWO CASES OF ILEOSIGMOID KNOTTING
IN UGANDA. (E.) Shepherd, J. J.
kere Univ. Coll., Kampala, Uganda). Brit. J.
g. 54(6):561-566, 1967.

rteen of the 14 females (93%) and 55 of the 78
es (70%) were from the Baganda tribe; the age
ge was from 11-75 yr., with an av. of 42 and
highest incidence was found in those aged
39 yr. Only 1 patient gave a history of pre-
us acute abdominal symptoms. Significant
senting symptoms included pain, vomiting
ich usually occurred at onset of pain), con-
pation and distention. In 73 (80%) of the
ients part of the intestine was gangrenous; in
cases either the small intestine alone, or
h the small intestine and the pelvic colon,
gangrenous, and in only 4 cases was the pelvic
lon gangrenous and the small intestine viable.
rtality rate was 50%, as 46 of 92 patients died;
nce 3 died without operation, the operative
rtality was 48%. Patients who were seen within
hr. had a mortality rate of 41%, whereas those
ming after 24 hr. had a mortality rate of 70%.
ong patients seen within 24 hr., the death rate
r those with viable intestine was higher than
r those with gangrene. While ileosigmoid knot-
ng has often been considered as a variant of
lvulus of the sigmoid colon, it is suggested
at it is more likely to be associated with ex-
ssive motility of the ileum. Development of
eosigmoid knotting has been suggested as follows:
loop of small intestine passes down the left
racolic gutter, and the small intestinal loop
rns upward to commence a clockwise knot; an
ternative anticlockwise knot may develop; the
ex of the loop enters an internal hernia; the anterior wall of the hernial orifice is the base of the loop and its mesentery; usually the small intestine becomes gangrenous first, and later the sigmoid colon. Surgical correction consists of placing clamps to that portion of the small intestine and its mesentery which constitutes the anterior wall of the internal hernia. After division, the small intestine can be gently unwound and removed. If gangrenous, the sigmoid colon is excised, the distal stump closed, and the proximal end exteriorized as a terminal colostomy. This latter procedure transforms the operation from one that is complex and lengthy to one that is simple and rapid.

10266 CHANGES IN THE INTRAMURAL NERVOUS APPARATUS OF THE DUODENUM AND DUODENAL STASIS. (Rus.) Mirzaev, A. P. (Leningrad Sanit. Hyg. Med. Inst., USSR) and M. A. Petushinov. Vestn. Khir. Grekov. 93(5):19-23, 1967.

Seven patients (3 females, 4 males; 20-54 yr. old) with the acquired form of duodenostasis (based on clinical, roentgenological and surgical data) were divided into 3 groups. In Group 1, consisting of 2 patients with moderate symptoms and duration of the disease for 3 and 7 yr., resp., and with a clinical diagnosis of cholecystitis, surgery revealed duodenostasis in the compensation stage. Upon neurohistological study, neural elements in the ganglion were slightly changed, this was basically correlated to a lesion which was reactive in character, e.g., the initial stage of reversible changes of the stimulative type. Group 2 consisted of 2 patients with pain symptoms and dyspeptic disorders and duration of disease of 6 and 19 yr., resp.; these had previously been operated upon for duodenostasis (duodenojejuno anastomosis); surgery revealed duodenostasis in the subcompensation stage; neurohistological study revealed changes which were mainly parabiotic or paranecrotic in character. Group 3 consisted of 3 patients with a pronounced clinical picture of disease and pathological processes in the stomach, gallbladder and pancreas, of up to 15 yr. duration; these had been operated upon previously, and had been diagnosed as having the decompensation stage of duodenostasis; changes in the intramural nervous apparatus had an irreversible necrotic character of Stages 2-3 in 1 patient, and Stage 3 in 2 patients. Changes included argentophilia, pyknosis, eccentric location of nuclei, protoplasmic enlargement, increase in dendrites, vacuolization, and others. A definite correlation was found between the clinical picture of duodenostasis and changes in the elements of the intramural nervous system of the duodenum, e.g., the greater the changes in neural fibers and cells of Auerbach's plexus of the duodenal wall, the greater were the anatomical changes and the more pronounced the clinical picture of the disease. Possible causes for the development of functional changes in the intramural nervous apparatus are discussed. Three case histories are given in detail.

10267 MASSIVE SMALL-BOWEL RESECTIONS. OPERATIVE AND DIETARY MANAGEMENT.

(E.) Leonard, A. S. (U. Minnesota Hosp., Minneapolis), A. S. Levine, R. Wittner, H. Buchwald and R. L. Varco. Arch. Surg. (Chicago) 95(3):429-435, 1967.

Massive small-intestinal resections were performed on 2 patients; a 41-yr.-old white male with high small-intestinal obstruction and peritonitis had massive small-intestinal resection and an ascending jejunocolostomy done, leaving 45.7 cm of proximal jejunum, while a 4-yr.-old Latin American boy with intestinal volvulus and peritonitis had only 20.3 cm of proximal jejunum remaining after resection. Each also had bilateral truncal vagotomy, pyloroplasty and gastrostomy performed. Vagotomy and pyloroplasty was done to decrease gastric hypersecretion. Postoperatively, continuous gastrostomy feedings were maintained until p.o. intake was tolerated, and initial p.o. intake of fluids was minimized by use of i.v. therapy to replace stool losses and maintenance needs. The patients were fed a high-protein, low-fat, low-carbohydrate, nonfiber-containing feeding formula which was admin. through a 24-hr. period with a constant infusion pump; this appeared to decrease diarrhea and steatorrhea, and to allow more efficient absorption, particularly during the first postoperative mo. It is believed that close adherence to these principles led to survival of the 4-yr.-old child 1 yr. after massive resection, and was responsible for a wt. gain from 26 to 32 pounds during this period. The adult patient, 2 yr. after massive resection, gained 20 pounds, from 160 to 180. Balance studies in the child showed that by 3 mo. 25%, and by 4 mo., over 50% of the fat was absorbed; increased fat absorption was further demonstrated by vitamin A and carotene levels, which increased from an av. of 20 to an av. of 50 mg/100 ml and from 24 to 34 mg/100 ml, resp., over a 4-mo. period. Similarly, prothrombin time returned to normal within the first 3 mo. N absorption increased considerably in the first 4 wk. and balance became positive by 3 mo., at which time the diet described heretofore was begun. Ca balance was preserved over the entire period of hospitalization. Special studies at 1 yr. after operation revealed cholesterol absorption to be almost absent and the serum cholesterol in the low range (130-140 mg/100 ml). Cyanocobalamine absorption was far below normal in the 2% range (Shilling test); a decreased vitamin A tolerance and decreased carotene, at 30-50% of normal, were noted. At 1 yr., xylose and folic acid absorption were normal, as were liver functions and plasma protein composition. Both patients are now maintained on a high-protein, low-fat, bland regimen, with the gastrostomy tube still in place in the child. It is concluded that the comparatively rapid stabilization of the child and his favorable anabolic state demonstrate that such children can be salvaged by adhering to these principles.

10268 PRODUCTION OF ARTIFICIAL SPHINCTERS. ABLATION OF THE LONGITUDINAL LAYER OF THE INTESTINE.

(E.) Schiller, W. R. (Northwestern U. Med. Sch., Chicago, Ill.), L. J. A DiDio and M. C. Anderson. Arch. Surg. (Chica 95(3):436-442, 1967.

Resection of the small intestine was performe in normal mongrel dogs; the length of intesti from the main pancreatic duct to the ileoceca junction was measured, and in 12 dogs the dis 75% was resected, leaving approx. 4 inches of terminal ileum and the ileocecal area intact; in 25 dogs, 90% of the small intestine was re leaving approx. 2 inches of proximal jejunum, inches of terminal ileum and the duodenum int Intestinal continuity was restored with an op 1-layer anastomosis. Animals with either typ resection were then divided into 4 groups: G 1 served as controls; in Group 2, an isoperis segment measuring 3-4 inches in length was co structed in the remaining distal jejunum; Gro was similar to Group 2, except that the isola jejunal segment was reversed (antiperistaltic and in Group 4, intestinal resection was foll by the circumferential removal of 1-cm strips longitudinal muscle, except for the part of t layer which was covered by mesentery; the und lying circular (closing) component was thus f to contract unopposed; 2 of these artificial sphincters were placed 3-4 inches proximal to the jejunoileal anastomosis. A 90% resection was associated with a high mortality, whereas could adjust to loss of 75% of the lower smal intestine. Interpolation of isoperistaltic se ments did not improve results. Some animals with antiperistaltic segments interposed into the intestinal stream sustained a wt. loss wh was less than controls; however, there was a rate of complications in this group, includin obstruction and anastomotic disruption. Remo of 1-cm segments of longitudinal muscle produ a short segment of intestine with a sphincter action; these artificial sphincters not only a peared to increase survival time and reduce w loss, but also were associated with no risk o obstruction or disruption. Several animals su vived for extended intervals when these sphin were used after 90% intestinal resection. Mic roscopic studies showed that the myenteric (ne vous) plexus was removed along with the longitudinal muscle, but the segments did not appea to be as spastic as the aganglionic segment described for congenital megacolon. The techn feasibility of this procedure in the human has been shown, and clinical evaluation of this me of slowing transit seems warranted in patients with severe motility problems.

10269 THE SURGICAL AND METABOLIC ASPECTS O MASSIVE SMALL BOWEL RESECTION IN THE NEWBORN.

(E.) Benson, C. D. (Child. Hosp. Michigan, Detroit), J. R. Lloyd and K. L. Krabbenhoft. J. Pediat. Surg. 2(3):227-240, 1

A 5-yr. study of 10 newborns who had undergone extensive small intestine resection (some in excess of 50%) included fecal recoverability

^{131}I-tagged triglycerides, free fatty acids
d radioactive iodinated serum albumin as well
X-ray examination for bone age, Schilling tests,
neradiofluoroscopy and routine upper gastro-
testinal studies. Height and wt. was recorded
regular intervals and routine excretion studies
ployed Silver's method. In the early postopera-
ve period there was a serious inability to ab-
rb dietary fats and a lesser inability to ab-
rb protein. Carbohydrate tests gave results
thin normal limits. Bone age tests resulted in
lues within the normal range in all but 1 pa-
ent. Schilling tests on 3 of the older chil-
en produced results within the acceptable range.
e compensatory mechanism of the human body can
intain an adequate nutritional state with but
-35 cm of small intestine remaining after re-
ction, provided that the ileocecal valve is in-
ct. It is probable that there is an increase in
liber of the intestine along with an increased
porization of the villi and deepening of the
tervillous crypts. It is postulated that there
also some increase in length of the intestinal
mnant. At the termination of the study 8 of
e 10 patients were alive and well; the 2 who
ed had ruptured umbilical cord hernias. Re-
ction in both instances had included the ter-
nal ileum and ileocecal valve. It is concluded
at a minimum of 25-30 cm of small intestine plus
e ileocecal valve is sufficient for continued
trition and growth in the newborn. Attention
ward a better understanding of the physiologic
tential of the remnant is suggested.

270 EFFECT OF ARTIFICIAL COLLATERAL BLOOD SUPPLY UPON INTESTINAL AUTOGRAFT.
us.) Berlin, L. B. (Kirov Order of Lenin Med.
st., Leningrad, USSR) and V. F. Zhupan. Arkh.
at. 52(7):93-96, 1967.

each of 20 dogs 2 segments of the small in-
stine were taken (12-16 cm length) with vascular
anches consisting of 1 artery and an analogous
in; the continuity of the intestine was restored
end-to-end anastomosis. On each side of the
dominal wall incisions were made of s.c. pouches,
ing the length of intestinal transplants; the
ft transplant was incised transversely every cm
tween large vascular ramuli to submucous layers
d placed into the left s.c. pouch, while the
ght transplant without incisions and fixed in
e right pouch served as a control. The abdominal
vity was sewn; 1 end of both transplants sewn
to the s.c. bed, and the other brought out
rough special cutaneous incisions of the ab-
minal wall and sutured to the ends of the
taneous wounds. Ligation of vascular branches
s performed 5-60 days after transplantation.
e development of collateral blood supply of the
testinal transplant, grafted under the skin,
curred faster if stimulated by incisions of
e serous and muscular membranes and if ligation
the vascular branch was performed at a later
riod. Incisions of the intestinal wall stimu-
ted formation of vascular bonds of transplants
th surrounding tissue, showing a way toward improvement of blood supply to the grafted intestinal segment. In almost all the cases inflammatory, dystrophic and necrobiotic changes of focal character of the intestinal wall were noted. They were difficult to correlate directly with the time of vascular branch ligation and degree of collateral blood supply development.

10271 EXPERIMENTAL INVESTIGATIONS ON IMPROVEMENT OF INTESTINAL ABSORPTION IN DOGS SUBJECTED TO MASSIVE RESECTION OF THE SMALL INTESTINE COMBINED WITH USE OF THE ONLAY REVERSED SEGMENT OF THE INTESTINE. (E.) Sadowski, J. (Warsaw Med. Acad., Poland). Bull. Pol. Med. Sci. Hist. 10(2):85-92, 1967.

Ten dogs were divided into 2 groups of 5 each. Animals in the first group were subjected to resection of 66-75% of the small intestine; the animals became extremely emaciated and loss of wt. 2-3 mo. after resection amounted to 22-31% of the initial wt. The percentage of H_2O content in fecal solids was increased, and absorption of fat and protein was decreased, especially when they were placed on a high fat diet. Transit time of Ba after massive resection was shortened by 21-46%, as compared with nonoperated animals. The dogs were then subjected to a second operation, establishment of an onlay reversed segment taken from the terminal intestine; these animals regained their initial wt. 4-5 mo. after the second operation, and some exceeded their initial wt. There was improved absorption of fat and protein in comparison to preoperative values; this was observed during both a basic diet and a high fat diet. Radiological examination revealed a delay of the transit time of Ba, as compared to preoperative values, or slightly higher values than in nonoperated animals. No complications or side-effects were encountered after construction of the onlay reversed segment. Dogs of the second group were subjected to massive resection of the small intestine (the distal portion, whereas those in the first group had the proximal portion resected) combined with construction of the onlay reversed segment. There was an improvement in wt., and similar results to those obtained with animals in the first group. It is concluded that use of the onlay reversed segment improved intestinal absorption in dogs subjected to massive small intestinal resection.

10272 ROLE OF RECIRCULATING LOOPS IN THE MANAGEMENT OF MASSIVE RESECTION OF THE SMALL INTESTINE. (E.) Budding, J. (Christ Hosp. Inst. Med. Res., Cincinnati, Ohio) and C. C. Smith. Surg. Gynec. Obstet. 125(2):243-249, 1967.

A total of 54 young, healthy adult beagle dogs of both sexes were divided into 6 groups. In Group 1, the 6 dogs served as controls; 3 underwent a sham operation in the form of an exploratory laparotomy. In Groups 2-6, dogs underwent a 90% resection of the small intestine, with rearrangement of the remaining portion as a recirculating loop, including progressively more complicated procedures which required an increase in the number of intestinal anastomoses. In some dogs, 0.5 g of sodium taurocholate was added to a test meal to determine its effect upon absorption. The operative mortality rate increased as the number of anastomoses and complexity of the surgical procedure increased. The av. max. uptake for dogs in all groups during the preoperative control period varied from 14-18%; absorption was not affected by the sham operation. There was a significant postoperative decrease in fat absorption in dogs that had undergone resection; it dropped further after the first mo. and then leveled off. The addition of sodium taurocholate to the test meal had no predictable effect upon absorption. Blood chemistry was essentially normal in all groups. Neither controls nor animals that had undergone sham operation showed significant changes in gastric emptying time. In animals that underwent resection, the gastric emptying time increased from preoperative av. of from 2 hr. to 5-6 hr. postoperatively. The complexity of the operation was not related to the increase in gastric emptying time. Animals with the simplest operative procedure and least number of anastomoses survived longer and maintained their wt. better than those with more complex procedures and more anastomoses. In all dogs with resection, the results of varying degrees of malnutrition were evident. While animals with the simplest procedure (which consisted of a 90% resection of the small intestine including the ileocecal region, and insertion of a 5-cm long reversed segment of ileum end-to-end between the distal part of the small intestine and colon) gave the best results, there were several cases of serious complications; 5 died of obstruction, 2 of phytobezoars and 3 of volvulus. It is suggested that clinical application of corrective surgical procedures in the treatment of massive resection of the small intestine appears to be justified only when dietary and medicinal measures fail to maintain the patient in satisfactory condition.

10273 SINGLE-LAYER OPEN GASTROINTESTINAL ANASTOMOSIS. (E.) Bronwell, A. W. (Methodist Hosp., Lubbock, Tex.), R. Rutledge and M. L. Dalton, Jr. Ann. Surg. 165(6):925-932, 1967.

A study of 327 patients is presented in which single-layer and multiple-layer closures are compared; there were 136 colon anastomoses (95 single-layer and 41 multiple-layer), and 191 gastrojejunal anastomoses (89 single-layer and 102 multiple-layer). In anastomoses at both sites, patients with single-layer closures tolerated food and passed flatus and stool 24 hr. earlier than those with multiple-layer closures. There were no anastomotic leaks and no deaths in the single-layer series. In the multiple-layer anastomoses of the colon, 3 patients had leaks at the anastomotic site and 1 died. None of the multiple-layer closures of the gastrojejunal region leaked. It is concluded that single-layer anastomoses can be accomplished with less morbidity and with comparable mortality to multiple-layer closures. In comparison to results of this study, a survey of more than 300 American surgeons showed that most preferred 2-layer closures for both colonic and gastric operations.

10274 REAPPRAISAL OF OPEN INTESTINAL ANASTOMOSES. (E.) Hamilton, J. E. (U. Louisville Sch. Med., Ky.). Ann. Surg. 165(6):917-924, 1967.

Four types of open intestinal anastomoses were performed on 29 healthy mongrel dogs: (1) Stand the double-row inverting anastomosis; (2) Halste or single-row inverting stitch in which the need theoretically catches the submucosa only; (3) Navy, a 1-row through-and-through everting intestinal anastomosis; and (4) the modified Gambee, a 1-layer through-and-through inverting stitch. Anastomoses were done in tandem in the terminal ileum, the first located 6 inches above the cecu and the others each 5 inches proximal to the preceding and with rotation of position from dog tc dog; usually, all 4 methods were performed in the same animal. Analysis of gross anastomotic defects showed that Gambee and Navy each had 3 small defects sealed by adhesions, Standard had 4 defects, and Halsted had 1, a disruption of tl anastomosis and fatal peritonitis. The Navy method showed fewer adhesions than the Standard; and the Gambee had considerably fewer adhesions than the Standard, and slightly more than the Halsted method. Edema and inflammation of the suture line were far more pronounced in the Standard and Halsted technics than in the Gambe and Navy technics; all changes were most pronounced in the Standard, which also showed some areas of avascular necrosis. A study of the lu narrowing by the inverted anastomotic flange showed, by gross estimate, an av. of 54% for th Standard, 39% for the Halsted, 4% for the Gambe and 3% for the Navy technic. The Standard anastomosis av. 29 min. operating time, the Halsted 18 min., the Gambee 21 min. and the Navy 14 min By the air-inflation-leak test, the 4 methods w compared in 3 ways: last to leak, av. leak pre sure and % of each method not leaking under 50 Hg. Tests taken immediately after completion o anastomosis showed the Standard technic to be t strongest, and the Navy least secure; there was little difference between the Gambee and Halste During the crucial healing period from the thir to the sixth day, the Gambee was slightly weake throughout than the Halsted anastomosis, but stronger than the Standard; the Navy was by far the weakest of the 4 anastomoses. Two Standard and 5 Navy anastomoses, without obvious defect, leaked at pressures of 40 mm Hg or less. On th basis of these animal experiments and limited clinical experience (113 procedures), it is concluded that the Gambee method is superior to th other anastomoses tested, and is the procedure of choice in open intestinal anastomoses.

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eport is presented of the use of transmesenteric cation in 12 patients; 11 had acute small intinal obstruction and 1 had intermittent small estinal obstruction. A total of 33 previous iotomies had been performed in these 12 pants; in 1 patient with chronic obstruction, 10 or operations had been performed. The imiate postoperative course was uneventful in all ients; all tolerated fluid well on the fourth toperative day. A pelvic abscess developed in atient 3 wk. after operation and was drained nsvaginally. Obstruction recurred in 1 patient had the 10 previous operations for small intinal obstruction; plication was not used in air of this recurrence. Ten of the 12 pants had no further episodes of abdominal pain /or intestinal obstruction; in addition to the ase of recurrence of obstruction, 1 patient erienced mild postprandial pain for the first after operation. Thus, 10 of 12 patients foled for 2 mo.-5 yr. had an excellent result, another had a good result. Transmesenteric cation is a simple, rapid operation for the vention of small intestinal obstruction. Reery is rapid after the procedure and significant toperative ileus was not encountered. The of absorbable suture is not recommended and have been responsible for the 1 case of rerent obstruction in this series. It is advised t this procedure be used for recurrent intesal obstruction and should be considered when ietal or visceral peritoneal denuding has urred secondary to enterolysis or extensive rative procedures.

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See also abstract nos.: 9719,9736,9812,9813,9844,10159,10865

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10335 ABBREVIATED HISTALOG GASTRIC ANALYSIS. COMPARISON WITH PEAK ACID OUTPUT. (E.) Castell, D. O. (U.S. Naval Hosp., Bethesda, Md.), R. B. Johnson and H. A. Sparks. Amer. J. Dig. Dis. 12(7):713-719, 1967.

A total of 79 patients were subdivided into an ulcer group and a control group. The ulcer group included 37 patients (34 males, 3 females), with a mean age of 41 yr.; these had definite radiologic evidence of duodenal ulcer. In the control group there were 42 patients (37 males, 5 females), with a mean age of 43 yr.; this included patients with gastrointestinal complaints in whom X-ray study had given negative results, and also patients without gastrointestinal symptoms. Peak acid output after betazole (100 mg) stimulation during a standard gastric analysis was obtained in each patient, and the results were compared with the 30-min. acid output obtained in the same patient during the abbreviated gastric analysis performed by collecting gastric juice only during the interval from 45-75 min. after betazole (100 mg) stimulation. In controls, the mean value for peak acid output was 10.97 mEq/30 min., and the mean value for the abbreviated test was 8.44 mEq/30 min. For the 37 ulcer patients, the mean values were 16.27 and 12.35 mEq/30 min. for the standard gastric analysis and the abbreviated test, resp. During the abbreviated gastric analysis, 18 ulcer patients (49%) and only 6 controls (14%) had an acid output greater than 13.41 mEq/30 min.; also, 21 controls (50%) and only 7 ulcer patients (19%) had an acid output less than 7.68 mEq/30 min. A striking degree of overlap between the ulcer and control groups was shown by both procedures. The limitations of gastric analysis as a diagnostic tool for the differentiation of ulcer and nonulcer patients is again emphasized since, in 32.9% of the subjects, incorrect diagnoses were drawn from results of both methods of gastric analysis. It is concluded that the shorter and more tolerable abbreviated gastric analysis may be as useful as the standard gastric analysis (peak acids) in evaluating the individual patient's secretory potential.

10336 BENIGN GASTRIC ULCER WITH LIFE-THREATENING HEMORRHAGE. (E.) Stafford, E. S. (Johns Hopkins U. Sch. Med., Baltimore, Md.), W. F. Ballinger, II, G. D. Zuidema and J. L. Cameron. Ann. Surg. 165(6):967-976, 1967.

In a series of 239 patients operated upon for benign gastric ulcers, 116 were bleeders, and 66 (57%) of these were uncontrollable bleeders. Of 203 patients under age 70, 92 (45%) bled; of these, 52 bled uncontrollably and 8 died after operation (15%). There were 36 aged 70 or over, of whom 24 were bleeding (67%); among the latter, 14 bled uncontrollably and 6 (43%) died. There were 49 patients (21%) in the series who bled on 1 or more occasions before hospitalization during which operation was performed; of these, 21 (4
bled uncontrollably on this admission. Of 190
patients who had never bled before, 45 (24%) we
admitted with uncontrollable bleeding on this
occasion. Of the 239 patients, there were 151
men and 88 women; of 66 with uncontrollable
bleeding, there was only 1 woman among 14
patients who died in the hospital after operat
When considered from a socioeconomic standpoin
there were more who were bleeding among ward
patients (75 of 126) than among private patien
(41 of 113 or 36%). Furthermore, there were 4
ward patients (69%) and only 21 private patien
(32%) among the 66 who were bleeding uncontrol
Nearly half (28) of 66 patients with uncontrol
bleeding had significant coexisting disease,
including esophageal hiatal hernia in 7, urolo
disease in 4, arthritis in 4, cardiovascular
disease, cirrhosis of the liver, psychosis and
pulmonary disease in 3 each, and diabetes and
severe trauma in 1 each. All 66 patients with
uncontrollable bleeding received large amounts
of blood after surgery; of 52 survivors, 20
received 3 or more liters, but of 14 who died,
10 received 3 or more liters. Most gastric
ulcers were found in the prepyloric area or al
the lesser curvature, but there were 7 among 6
with uncontrollable bleeding whose ulcers were
located in the upper stomach; 6 of these 7 had
postoperative complications, and 4 (57%) expir
in the hospital. Of the 66 with uncontrollabl
bleeding, surgical procedures included 44 part
gastrectomies (vagectomy included in 8); among
these, there were 9 postoperative, in-hospital
deaths. Excision of the ulcer was done 13 tim
including 5 accompanied by pyloroplasty and 4
accompanied by pyloroplasty and vagotomy; ther
were 2 deaths in this group. One of 2 patient
treated by sleeve resection alone died. Four
underwent ligation of a bleeding vessel in the
base of the gastric ulcer combined with pyloro
plasty and vagectomy; 1 of these died. Two
patients were treated by gastrojejunostomy and
vagectomy, and 1 died. Fourteen of 66 died, f
a mortality rate of 21%, compared with a
mortality rate of 3% in 173 patients with gastric ulcer operated upon for all reasons other
than uncontrollable hemorrhage. Of 14 patient
70 or more yr. of age, with uncontrollable
bleeding, there were 8 men and 6 women; 6 of
men (75%), and no women died. Of 46 of the 6
patients with uncontrollable bleeding availabl
for long-term evaluation, 30 (65%) were considered to have excellent results subsequent t
operation, and 16 (35%) had a poor result
initially, although 4 of these subsequently
became asymptomatic; thus, at time of report,
(74%) were asymptomatic and had resumed normal
activities.

10337 VALUE OF VARIOUS GASTRIC SECRETION TESTS IN RELATION TO SURGICAL TREAT-
MENT OF GASTRODUODENAL ULCER. (It.) Mercati,
(U. Perugia, Italy), P. Furiosi and F. Pasqui
Gazz. Int. Med. Chir. 72(11):936-949, 1967.

ults of 3 gastric secretion tests performed
chronological succession were evaluated in 82
er patients (28 gastric; 54 duodenal) and in
normal controls. The following tests were
formed: (1) nocturnal gastric secretion
ording to a modified Levin-Kirsner-Sundweiss
hod (samples obtained every 60 min.); (2)
mented histamine test according to Kay (0.04
kg of histamine HCl with sampling every 15 min.
l hr.); (3) insulin stimulation test accord-
to Hollander (15 U of insulin followed by
pling every 15 min. between 30 and 90 min.).
al nocturnal gastric secretion (over a 12-hr.
iod), vol./hr., and av. HCl conc. was 350 ml,
ml, and 24 mEq/liter, resp., in controls,
compared to 580 ml more than 40 ml, and 57
/liter, resp., in 70% of duodenal ulcer
ents; 350 ml, 0, and 45 mEq/liter, resp., in
remaining 30% of ulcer patients; 310 ml, 0,
30 mEq/liter, resp., in gastric ulcer
ents. Augmented histamine secretion and max.
output was 180 ml and 19 mEq/hr., resp., in
rols as compared to 250 ml and over 40
/hr. resp., in 70% of duodenal ulcer patients;
ml and 50 mEq/hr., resp., in the other 30%;
ml and 35 mEq/hr., resp., in gastric ulcer
ents. No increase in the vol. (av. 55 ml)
gastric secretion or in HCl conc. was observed
of 10 controls following insulin stimulation;
ng the 70% group of duodenal ulcer patients,
showed no increase after insulin stimulation,
le others showed marked increase in gastric
retion (70-100 ml) and high free HCl conc.
mEq/liter); an increase in HCl conc. was
ed in the 30% group of duodenal ulcer patients
er insulin. Gastric ulcer patients also
wed an increase in HCl secretion after insulin.
hough the results are not probative from a
ictly diagnostic point of view, a relation-
does exist between the state of gastric
retion and the surgical procedure which is
indicated.

8 PNEUMOCONIOSIS, EMPHYSEMA AND PEPTIC
ULCER. (Cz.) Vrána, J. (Palacky U.,
mouc, Czechoslovakia), R. Útata and V.
ička. Vnitrni Lek. 12(12):1203-1209, 1966.

incidence of gastroduodenal ulcers in 1304
ients treated for pneumoconiosis was estimated.
the total, 268 showed symptoms of mild and
of severe obstructive emphysema. Gastro-
denal ulcers were found in 5.7, 5.9, and 5.5%
patients without symptoms, with mild symptoms,
with severe symptoms of obstructive emphy-
a, resp. Differences were not observed in
production and acidity of gastric juice
lected from those with pneumoconiosis com-
cated by obstructive emphysema and from
lthy individuals. Similarly, differences
e not found when gastric juice collected from
ients with gastroduodenal ulcers was compared
h that collected from patients with ulcers
pneumoconiosis complicated by obstructive
hysema. The present study failed to contri-
e evidence for the suggested higher incidence
of gastroduodenal ulcers in patients with obstructive emphysema.

10339 DEATHS FROM PERFORATED PEPTIC ULCER. A SURVEY OF 633 CASES IN THE WEST OF SCOTLAND. (E.) MacKay, C. (Western Infirm., Glasgow, Scotland). Scand. J. Gastroent. 1(4): 299-305, 1966.

From 1954 to 1963 there was an 11.8% increase in the fatality rate from perforated peptic ulcer, according to a survey including all hospitals which accept medical and surgical emergencies in Glasgow, the counties of Argyll, Dunbarton, Lanark, and Renfrew; the area in West Scotland represents about 2.2 million persons. The fatality increase is believed due to the increasing (statistical) age of patients. Female mortality was 18.0% and male was 10.8%. Most deaths occurred in February, and between midnight and 4 a.m; delay in surgical intervention increased the rate. The perforated gastric ulcer fatality rate was 26.1%, the rate for perforated pyloroduodenal ulcer 10.4%, and stomal 15.1%. Only cases confirmed at operation or autopsy were included in the survey. Conservatively-treated cases were not included. The survey technic was that of Illingworth et al. (1944) and Jamieson (1955). The high fatality rate for perforations at the gastric site was almost evenly divided according to sex: males 25.8% and females 26.5%. Pyloroduodenal perforation fatality was lower in males (9.6%) than in females (15.7%). The sex differences may be due to age differences among those studied: the mean age for males with pyloroduodenal perforation was 45.6 yr., and 49.6 for females; male mean age in gastric perforation was 50.8, and females 51.9.

10340 VAGOTOMY-PYLOROPLASTY FOR DUODENAL ULCER: A CRITICAL APPRAISAL OF EARLY RESULTS. (E.) Herrington, J. L., Jr. (Edwards-Eve Clin., Nashville, Tenn.). Surgery 61(5): 698-704, 1967.

A report is made of the results of this procedure on 101 patients, 15 of whom were followed for 6-8 yr. and 86 of whom had been under observation for 2-5 yr. The av. follow-up was 3.5 yr. Patients consisted of 72 men and 29 women with an age range of from 22-84 yr., the av. age being 52.5 yr. In this series the operative mortality was 5%, due to the poor condition of the majority of the patients and to the presence of associated disease. The incidence of recurrent ulceration was 7.3% over a relatively short follow-up period. At present 53% are symptom-free: 30% have minor postoperative complaints. It is concluded that vagotomy-pyloroplasty is not the operation of choice for complications of duodenal ulcer. It should be recommended only for poor risk patients and where time and technical considerations preclude an operation of greater magnitude.

10341 ELECTIVE OPERATIONS PERFORMED FOR DUODENAL ULCER, WITH THEIR MORTALITY. RESULTS OF A SECOND SURVEY IN SELECTED OHIO HOSPITALS BY THE SURVEY COMMITTEE, OHIO CHAPTER, AMERICAN COLLEGE OF SURGEONS.

(E.) Hoerr, S. O., Chairman (Cleveland Clin., Ohio). Amer. J. Surg. 114(3):427-430, 1967.

This second survey was designed to study the frequencies with which 6 standard surgical procedures were electively used for chronic duodenal ulcer, and their mortality, and to compare them with the frequencies and the mortality in the first survey. These procedures were gastrectomy, gastrojejunostomy and pyloroplasty, each with or without vagotomy. Data were obtained in 35 Ohio hospitals of 6259 patients operated on between 1957 and 1966 in 15 communities; the hospitals ranged in size from 150-943 beds and were situated in communities ranging in size from a population of 9,000 to a million or more persons. The overall mortality of 2.6% represented a reduction from the overall mortality of 4.3% in the first survey. A smaller number of gastric resections and a larger number of drainage procedures were performed in the period of the second survey than during the first. Each procedure, with its mortality, was as follows: gastrectomy, 2,206 patients, 77 deaths (3.5%); gastrectomy and vagotomy, 1,732 patients, 41 deaths (2.4%); pyloroplasty and vagotomy, 1,561 patients, 19 deaths (1.2%); gastrojejunostomy and vagotomy, 496 patients, 9 deaths (1.8%); pyloroplasty only, 70 patients, 3 deaths, (4.3%); and gastrojejunostomy only, 194 patients, 11 deaths (5.7%). A great majority (77%) of operations were performed by qualified surgeons, and only 2% were performed by so-called unqualified surgeons; the mortality of patients operated on by the former (2.3%) was lower than that of patients operated on either by residents (3.5%) or by unqualified surgeons (3.8%). These findings were in contrast to those of the first study, in which the experience of the surgeon did not appear to exert a significant influence. The size of the hospital, the size of the community and whether the hospital had a closed or an open staff did not seem to affect the overall mortality. Gastrectomy with or without vagotomy had a significantly greater mortality (3%) than the drainage procedures with or without vagotomy (1.8%).

10342 RESULTS OF TREATMENT OF ONE THOUSAND PATIENTS WITH PERFORATED GASTRODUODENAL ULCER.

(Bul.) Stoianov, A. Khirurgiia (Sofia) 20(2):100-106, 1967.

Of 1012 patients treated from 1954-64, 1000 had perforated gastric (426) and duodenal (574) ulcer while 12 had perforation due to gastric cancer. Of 1000 patients (938 males, 62 females; age 20-over 70 yr.), suturing was performed in 930, (93%) with death in 64, (69%) while 70, (7%) were treated by resection, 3 (4.2%) died. Av. mortality in 11 yr. was 6.7%. The outcome of surgery does not depend on the method, but on the time lapse between perforation and surgery Surgery within the first hr. after perforation was performed in 485 (48.5%) of whom 22 (32.9% died; from 1-6 hr. after perforation in 437 (43.7%) of whom 33 (49.2%) died; 6 hr. after perforation in 78 (7.8%) of whom 12 (17.9%) di Of 67 dead, 56 died from peritonitis and paralytic ileus, 4 from emboli of pulmonary arteri 4 developed hemorrhaging ulcer in the postsurgical period, 3 from pulmonary complication (active tuberculosis in 1). On day 1 after surgery 13 died; in general, by day 1-2 after surgery 22 died (32.8%). Cleaning and washing of the abdomen is recommended; if necessary th small intestine contents should be removed during surgery by means of temporary enterotomy. Results of 1250 patients treated during 1947-1 are used for comparison.

10343 PLANTAGLUCIDE TREATMENT OF PATIENTS WITH GASTRITIS, ULCER DISEASE OF THE STOMACH AND DUODENUM.

(Rus.) Podval'niukova, T. F. (Kiev Med. Inst., USSR). Vrach. Delo (4 142-144, 1967.

Plantaglucide (a Plantago major leaf extract; admin. p.o., 1 tablet 3 times a day for 3 wk.) was given to 76 patients (66 males, 10 females 17-60 yr. old), 21 of whom had gastric ulcers, 42 of whom had duodenal ulcers, and 13 of whom had chronic gastritis during the period of exacerbation. It was most effective in those patients with reduced and normal secretory and acid-forming gastric function; it was slightly effective in patients with markedly increased acidity of the gastric juice, and not effectiv in patients with complicated peptic ulcers. Complicated peptic ulcers were found in 8 patients, and 18 had peptic ulcers combined wi secondary chronic liver and bile tract disease By day 5-7 of treatment (in most of the patien pain, dyspeptic symptoms and tympanites disappeared, stool was normalized and appetite improved. At the end of 3 wk. of treatment, protective muscular tension of the anterior abdominal wall and local painfulness disappear the general condition markedly improved, hepatomegaly was reduced in 8 of 18 and was less painful in 13 of 18; both clinically and radio logically, spastic symptoms and pain in the large intestine stopped. Essential changes of the urine and blood, as well as antitoxic and prothromoin-forming function of the liver, wer not evident. Latent gastric hemorrhages terminated in all of the patients. The quanti and acidity of the gastric content increased with a tendency toward normalization only in t patients (21) who demonstrated reduced values before treatment; bile showed some decrease in inflammatory elements. Of 54 patients with gastric and duodenal niche, the latter disappe in 25 and was reduced in size in 24; in most o the patients there was a simultaneous decrease in the swelling of the mucous membrane plica, gastric tonus, disappearance of spasms of the pylorus and improvement of Ba evacuation from stomach; symptoms of duodenitis were less ounced. Plantaglucid was well tolerated, did not induce any side effects.

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10356 VAGOTOMY IN GASTRO-DUODENAL-JEJUNAL ULCER. COLLOQUE DE STRASBOURG, 1964. (Fr.) Weiss, A. G. and L. F. Hollender. (Eds.) Paris, Expansion Scientifique Francaise, 1966, 431pp., $22.

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10360 COEXISTENCE OF OBLITERATIVE ARTERIOSCLEROSIS AND GASTRIC OR DUODENAL ULCER. (Pol.) Czyżewski, K. (1st Surg. Sch., Wroclaw, Poland), T. Dorobisz, J. Doliński and K. Skóra. Pol. Tyg. Lek. 22(29):1115-1117, 1967.

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See also abstract nos.: 9769,10152,10566

Erratum: GAC2:4165 -Lines 15, 16 and 18 change "motility" to "mortality"

10391 AN EPIDEMIOLOGICAL STUDY OF ULCERATIVE COLITIS AND REGIONAL ENTERITIS AMONG ADULTS IN BALTIMORE. I. HOSPITAL INCIDENCE AND PREVALENCE, 1960 TO 1963. (E.) Monk, M. (Johns Hopkins U. Sch. Hyg., Baltimore, Md.), A. I. Mendeloff, C. I. Siegel and A. Lilienfeld. Gastroenterology 53(2):198-210, 1967.

Information was obtained about all Baltimore, Maryland area residents aged 20 yr. or more with ulcerative colitis, regional enteritis or ulcerative proctitis hospitalized during the 39-mo. period October 1960-December 1963. On the basis of hospital record information, gastroenterologists confirmed the diagnoses of these diseases. Av. annual prevalence rates, based on total hospital admissions for these diseases and on 1960 United States census data, were calculated for specific age, sex, and color groups; prevalence rates for Jews and Gentiles were based on population estimates from a marketing survey of the Baltimore area. Incidence rates, for patients hospitalized for these diseases for the first time during the study period, were determined for the same groups. Hospital incidence and prevalence rates for both ulcerative colitis and regional enteritis were higher for Jews than Gentiles and for whites than for nonwhites. The female incidence and prevalence rates for ulcerative colitis were higher than male rates, but the sex difference was reversed for regional enteritis. Younger males and middle-aged females had somewhat higher rates for ulcerative colitis than men and women in other age groups, but no age pattern was evident in regional enteritis. For both diseases, incidence rates for persons 50 yr. and older were not markedly lower than those for younger people. After comparison of these hospital incidence rates with those from other countries, it was concluded that this hospital data gave a fairly accurate estimate of total community incidence. Further analysis of the data made it seem unlikely that diagnostic prejudice and differential likelihood of hospitalization for the groups studied could account for all of the difference in rates between whites and nonwhites and between Jews and Gentiles.

10392 SURGICAL TREATMENT OF REGIONAL ENTERITIS. (E.) Colcock, B. P. (Lahey Clin. Found., Boston, Mass.). Amer. J. Surg. 114(3):398-401, 1967.

A total of 375 patients were operated upon for regional enteritis at Lahey Clinic up to June 1963; ages were 10-79 yr. old; sex distribution was approx. equal, but more women than men required repeat surgery. The main presenting symptoms were pain and diarrhea, very frequently associated with a palpable abdominal mass. Skip areas were found in 15-18% of the patients. Of 85 operated upon during the last 5-yr. period, 8.2% had ulcerative colitis in addition to enteritis, and another 8.2% had duodenal ulcer;
17% of the patients had associated anorectal
lesions, such as fissures, fistulas or abscess
In the last group of 85 patients, 74 had Ba X-
studies, and in 97.2% there was evidence of sma
intestinal disease; 24 of 74 had the character
string sign in the terminal ileum. Indication
for surgery included an acute onset, resemblin
appendicitis, and a chronic form of onset, non-
responsive to medical treatment. Resection wa
the procedure of choice for patients with chro
regional enteritis requiring surgery, with an
end-to-end anastomosis the preference of the a
Five patients who had a bypass procedure all r
quired resection because of recurrent or persi
symptoms. In the group of 85 patients operate
upon during the last 5-yr. period, there was 1
postoperative death in a young girl who had re-
moval of the colon for ulcerative colitis and
several previous resections for small intestin
fistulas; there were no deaths after surgery p
formed for regional enteritis alone for more t
10 yr. Morbidity after surgery also was low;
temporary cutaneous fistulas developed in 4 pa-
tients after resection but all healed spontaneously; 2 patients required incision and
drainage for an abdominal abscess. Within a 5-
yr. follow-up period, 25% (78) of 312 of the p
tients required reoperation; the other 75% are
either free of symptoms or have mild symptoms
that are well controlled by conservative thera

10393 WHITE BLOOD CELL COUNT IN REGIONAL ENTERITIS. REPORT OF TWO CASES. (E.
Smith, M. P. (Swedish Hosp. Med. Ctr., Seattle,
Wash.). J.A.M.A. 201(11):890, 1967.

A 53-yr.-old woman presented with possible acu
appendicitis; before surgery, her WBC count wa
13,000/mm^3, with a differential count of 55 po
morphonuclear WBC, 6 monocytes and 39 lymphocy
some of which appeared atypical. At laparotom
a 12-inch segment of terminal ileum exhibited
the changes of regional enteritis; since the
proximal end of intestine was not obstructed t
involved segment was not resected and the pati
recovered satisfactorily. A 63-yr.-old white
presented with acute intestinal obstruction of
the lower jejunum; the initial WBC count was
5200/mm^3, with a differential count of 41 polymorphonuclear WBC, 16 stab cells, 7 eosinophil
14 monocytes and 22 lymphocytes, some of which
were atypical; on the second day, the WBC coun
had decreased to 4000/mm^3, with a differential
count of 50 polymorphonuclear WBC, 6 stab cell
6 eosinophils, 20 monocytes and 18 lymphocytes.
Laparotomy revealed changes of regional enteri
in the distal half of the small intestine; no
pass or resection of the intestine was made si
the proximal half of the small intestine was n
mal and undilated. The patient had mild diarr
for 3 mo. postoperatively. Review of 29 cases
of regional enteritis admitted in 1965 showed
11 had a blood smear that contained atypical
lymphocytes and an increased number of monocyt

is type of smear was not seen in those patients th an elevated WBC count accompanying a fistula severe intestinal obstruction, but it was seen some patients with recurrent disease. It is stulated that an inflamed intestine allows entry viruses into the body which in turn produce anges in the blood picture.

394 THE DIAGNOSIS OF CROHN'S DISEASE OF THE COLON. A CLINICO-PATHOLOGICAL
UDY. (E.) Schofield, P. F. (Manchester Roy. firm., England) and H. Fox. Brit. J. Surg. (4):307-311, 1967.

lonic inflammatory disease (75 cases) and anal ceration (1) are reviewed. Patients were clasfied into 2 groups: those with ileal disease, d those without. In Crohn's disease 40% showed history of less than 6 mo. while 60% had less an a yr. history. Whereas no pain was reported ulcerative colitis, 64% of patients with Crohn's sease had pain as a symptom. Diarrhea was common both diseases with bleeding in most of the cerative colitis patients but only 33% of paents with Crohn's disease showed this sign. indolent, painless, irregular ulcer is the pical perianal lesion with fissure and fistula-ano frequently found in Crohn's disease. gmoidoscopy showing irregular separate ulcers with intervening normal or cobblestone mucosa are diagnostic of Crohn's disease. Ba enema shows patchy involvement in the colon in Crohn's disease. Pathological diagnosis of Crohn's colitis rested on tuberculoid granulomata, intramural abscesses, and transmural or serosal inflammation. The presence of the first was a definite indication of Crohn's colitis, though the criterion was used in only 2 cases, the other 31 showed 1 or both of the other diagnostic features. The suggestion is made that a large number of cases of colitis which come to surgery may be examples of Crohn's disease.

10395 REGIONAL ILEITIS IN CHILDHOOD. (E.)
Rubin, S. (Kansas U. Sch. Med., Kansas City, Mo.), R. W. Lambie and J. Chapman. Amer. J. Dis. Child. 114(1):106-110, 1967.

10396 ACUTE AND SUBACUTE REGIONAL ENTERITIS.
(Pol.) Bielska-Fałda, H. (2nd Surg. Clin., Warsaw, Poland) and B. Maliński. Pol. Tyg. Lek. 22(7):254-256, 1967.

10397 REGIONAL ENTERITIS. OCCURRENCE IN A FATHER AND BOTH SIBLINGS. (E.)
Aronson, A. R. (New York U. Med. Ctr., N. Y.) and M. Ruoff. J.A.M.A. 201(4):267-269, 1967.

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10398 IRON ABSORPTION AFTER GASTRECTOMY: AN EXPERIMENTAL STUDY IN THE DOG. (E.) Kelly, K. A. (U. Washington Sch. Med., Seattle), A. Turnbull, E. E. Cammock, C. T. Bombeck, L. M. Nyhus and C. A. Finch. Surgery 62(2):356-360, 1967.

The effect of various gastric operations on the absorption of Fe added to food was studied in mongrel dogs rendered Fe-deficient by phlebotomy. The type of operation and percentage absorption of Fe in each case for 7 groups of animals was as follows: 1) control animals, splenectomy only, 86% absorption; 2) 75-80% distal gastrectomy, gastroduodenostomy and splenectomy, 28% absorption; 3) 75-80% distal gastrectomy, gastrojejunostomy and splenectomy, 22% absorption; 4 and 5) total gastrectomy, esophagoduodenostomy and splenectomy, or gastric bypass with esophagojejunostomy and splenectomy, 2.7-13.0% absorption; 6) 60% proximal gastrectomy and splenectomy, 22% absorption; and 7) total gastrectomy with jejunal pouch interposition and splenectomy, 23% absorption. The effect of ascorbic acid in enhancing absorption of Fe with food was determined in animals with partial gastrectomy and other operations; with a test meal alone, absorption had a mean of 28%, but with admin. of 80 mg ascorbic acid with the test meal, absorption increased to 54%; a further increase of ascorbic acid to 400 mg resulted in a mean absorption of 64%. It is concluded that the presence of the stomach is indispensable for normal Fe absorption.

10399 METABOLIC EFFECTS OF CONTROLLED JEJUNOCOLIC BYPASS. (E.) Shibata, H. R. (Roy. Victoria Hosp., Montreal, Canada), J. R. MacKenzie and R. C. Long. Arch. Surg. (Chicago) 95(3):413-428, 1967.

Observations on the metabolic effects of jejunocolic bypass in 11 grossly obese patients (4 men, 7 women; 20-55 yr. old; wt. range was 193-428 pounds) are presented. The length of jejunum selected for anastomosis was 15 inches (4 patients), 20 inches (5 patients) and 25 inches (2 patients). Wt. loss (which ranged from 67-218 pounds) was noted in all patients and occurred most rapidly in the 15-inch bypass patients; it was directly proportional to the amount of fat excreted in the stool. Diarrhea was a problem in all patients but stabilized within 6-12 mo. after bypass. Xylose studies showed improvement after 6-12 mo. due to prolonged transit time and compensatory increases in absorptive capacity of the jejunum; glucose tolerance curves were flattened as in other series and remained flattened. Glucose i.v. tolerance tests showed 2 frankly diabetic patients maintaining a diabetic pattern postoperatively despite a flattened p.o. glucose tolerance curve. Fat excretion was inversely proportional to length of jejunum used for bypass. Serum cholesterol and total serum lipids were decreased to 40-50% of the preoperative values and remained decreased. Cholesterol esters remained unchanged. Plasma protein levels were decreased immediately after bypass, but became normal with stabilization of wt. Electrolyte difficulties were associated with anorexia, diarrhea, vomitin and nausea. In 1 patient, a low serum Ca level which led to tetany was corrected by raising the serum albumin with the i.v. admin. of normal human serum albumin. Gastric secretion studies were essentially unchanged by the bypass. Pulmonary function improved with wt. loss in all pa tients; 2 patients with alveolar hypoventilation syndrome reverted to a normal ventilation/perfus pattern. Liver function studies which were abnormal immediately after operation all became normal with time; liver structure remained essentially unchanged except in 2 patients. One patient had continuity of the intestine restored for marital and psychological difficulties; 1 death occurred and was attributed to hepatitis. It is concluded that although the jejunocolic bypass is a drastic measure for controlling obesity, it may be justified in a few carefully selected patients.

10400 BILE-SALT DEFICIENCY IN THE STEATORRHE FOLLOWING RESECTION OF THE ILEUM AND PROXIMAL COLON. (E.) Hardison, W. G. M. (Bosto City Hosp., Mass.) and I. H. Rosenberg. New Eng J. Med. 277(7):337-342, 1967.

Four subjects (2 men, 2 women; 45-65 yr. old) with steatorrhea after resection of the lower small intestine were studied; short cholic acid half-lives in all indicated excessive bile-salt loss. A resultant deficiency was manifest in low duodenal bile-salt conc. in 2 of 3 subjects. The same 2 persons incorporated subnormal amount of fatty acid into the micellar phase of the duodenal fluid after a fat meal. In no subject did this bile-salt deficiency substantially inhibit lipolysis of fats, as judged by analysis of lipi classes in the stool. Feeding of sodium taurocholate improved fat absorption in all subjects and increased duodenal bile-salt and micellar fatty acid conc. in the 2 subjects with low valu These findings indicate that, in man, resection the lower small intestine interrupts the enterohepatic circulation of bile salts. The resultan deficiency causes defective intraluminal micelle formation, which is in part responsible for the steatorrhea seen after resection.

10401 JEJUNAL BIOPSY FINDINGS, MUCOSAL DEHYDROGENASE ACTIVITY, AND INTESTINAL ABSORPTION IN PATIENTS WITH COMPLICATIONS AFTER PARTIAL GASTRECTOMIES. (E.) Burhol, P. G. (Ulleval Hosp., Oslo) and J. Myren. Scand. J. Gastroent. 1(4):314-323, 1966.

Mucosal changes in patients with post- (partial) gastrectomy complications were correlated with their dehydrogenase activity, mucosal measuremen and D-xylose and vitamin A absorption. Biopsies

e obtained by Crosby-Kugler's capsule (70-80 cm
m the teeth) in 28 men and women ranging from
76 yr. old, who had undergone (3 mo.-33 yr.
or) partial gastrectomy and gastrojejunostomy.
biopsy, dumping syndrome was present in 15 cases,
patients had lost weight, 3 complained of diar-
a since operation, 2 had ulcers, and 4 had
cinoma of the gastric remnant. Histology and
mistry indicated that some mucosal abnormalities
present in jejunal biopsy specimens from pa-
nts with complications after partial gastrec-
y. Reduced absorptive capacity may be indicated
the decreased dehydrogenase activity and impaired
ylose and vitamin A absorption.

02 EFFECT OF FATTY ACID STRUCTURE ON
ABSORPTION OF FATS BY SPRUE PATIENTS.
) Cancio, M. (U. Puerto Rico Sch. Med., San
n), R. Menéndez Corrada and C. F. Asenjo. Bol.
c. Med. P. Rico 59(4):155-160, 1967.

balance studies were performed initially
a period of 8 days in which a steatorrhea-test
t containing 80-100 g of animal and vegetable
s was given to tropical sprue patients and a
mal control, and continued while substituting
caloricly all of the fat in the diet for 1 of
following sources of triglycerides: 1) medium-
in-triglyceride oil, containing mainly fatty
ds of medium-chain length (20% capric, 78%
rylic); 2) hydrogenated soya oil, containing
nly saturated fatty acids of long-chain length
% palmitic, 90% stearic); and 3) olive oil,
ch contained mainly mono-unsaturated fatty
ds (76% oleic). Each experimental diet was
en for a period of 2 wk. Diet and stool
ples were analyzed for total fat content by
method of Van de Kamer, and for fatty acid
position by gas-liquid chromatography. In
paring the steatorrhea-test and medium-chain-
glyceride diets, all patients had steatorrhea
le on the former; it decreased significantly
le on the latter. Fatty acids present in the
ols of sprue patients were palmitic, stearic
oleic in decreasing order of magnitude. No
ic acid was present in stools of the control
le on the medium-chain-triglyceride diet; ab-
ption of caprylic acid was 100%, and that of
ric was 99% or better. No significant differ-
e in total amount of fecal fat output was
iced while sprue patients were on mono-un-
urated-triglyceride and steatorrhea-test diets;
both cases, fecal fatty acid output consisted
nly of palmitic and stearic acids, with some
ic acid, particularly while on the mono-un-
urated-triglyceride diet; absorption of oleic
d was 95% or more in all cases. In comparison
long-chain-triglyceride and steatorrhea-test
ts, fat output increased significantly while
the former; fatty acid excretion consisted
nly of stearic, and to a lesser degree, palmitic
d. Excretion of oleic acid during the long-
in-triglyceride diet was limited to 0.5% in 1
tient; absorption of stearic acid was poor in
patients. It is concluded that in tropical
rue patients, the longer the chain length of
a saturated fatty acid, the poorer is its absorption; unsaturated fatty acids seemed to be better absorbed than saturated fatty acids, both in sprue patients and in controls. The only fatty acids that appeared to be poorly absorbed by the sprue patients studied were saturated acids with 16 and 18 Ca atoms. Medium-chain triglycerides were absorbed as efficiently by the sprue patients as by the normal controls.

10403 ISOLATED LACTASE DEFICIENCY. CORRELATION OF LABORATORY STUDIES AND CLINICAL DATA. (E.) Welsh, J. D. (U. Oklahoma Med. Ctr., Oklahoma City), V. Rohrer, K. B. Knudsen and F. F. Paustian. Arch. Intern. Med. (Chicago) 120(3): 261-269, 1967.

A total of 170 subjects (109 men, 61 women; 145 white, 22 Negro, 3 American Indians; 3-80 yr. old) without gluten enteropathy had the following studies: 129 had p.o. carbohydrate tolerance tests, 111 had assays of disaccharidase activity on intestinal biopsy specimens, while 70 of the total had both procedures. The patients were divided into 2 groups: 123 with normal lactase activity (including 31 apparently healthy subjects, 24 with partial gastrectomy for peptic ulcer disease, 23 with functional gastrointestinal complaints, 16 with miscellaneous gastrointestinal diseases and 29 with nongastrointestinal conditions) and 47 with an isolated lactase deficiency (including 25 who were otherwise healthy, 7 with stomach surgery for peptic ulcer, 3 each with hepatitis, duodenal ulcers or miscellaneous gastrointestinal diseases, and 6 with miscellaneous nongastrointestinal conditions). Of the normal lactase activity group, 89 had lactose tolerance tests, and all had a max. blood glucose increase of 24 mg/100 ml or more over fasting; 73 had intestinal specimens obtained from the area of the ligament of Treitz, all with lactase activities over 1 U/g wet wt. of mucosa and sucrase; lactase ratios of less than 4:1. Forty of the isolated lactase deficiency group had lactose tolerance tests, and the max. blood glucose increase over fasting ranged from 0-21 mg/100 ml; 38 had intestinal specimens obtained from the area of the ligament of Treitz, all with lactase activities less than 1 U/g wet wt. of mucosa and sucrase to lactase ratios of more than 4:1. Glucose-galactose tolerance tests, the amount of lactosuria during the lactose tolerance test and the levels of sucrase, maltase, palatinase and alkaline phosphatase were similar to those of the normal lactase activity group. The difference in the sucrase to lactase ratio between the isolated lactase deficiency group and the normal lactase activity group was maintained in additional biopsy specimens from other areas of the proximal intestine. There was a higher percentage of individuals with isolated lactase deficiency in the Negroes and American Indians studied than in the whites. Of the normal lactase activity group, 15 gave a history of milk intolerance; in these patients, the milk intolerance was usually associated with intolerance to other foods, it was most common in postgastrectomy patients and rarely produced diarrhea. Fifteen of the 47 patients with an isolated lactase deficiency did not give a history of milk intolerance. All of the remaining 32 subjects gave a history of diarrhea after milk ingestion.

10404 INTESTINAL LACTASE DEFICIENCY AND SACCHARIDE MALABSORPTION DURING ORAL NEOMYCIN ADMINISTRATION. (E.) Paes, I. C. (State U. New York Upstate Med. Ctr., Syracuse), P. Searl, M. W. Rubert and W. W. Faloon. Gastroenterology 53(1):49-58, 1967.

The behavior of lactose absorption during admin. of neomycin or kanamycin (12 g/day) was studied in 10 obese patients using constant (1000 calorie) diets containing 27-155 g of lactose and 4-6-day study periods. Oral lactose tolerance and glucose-galactose tolerance tests were performed during control periods and during admin. of antibiotic(s). The av. increase in blood glucose during the oral lactose tolerance test was significantly less during the admin. of neomycin; a similar but less marked depression of blood glucose elevation was found with the glucose-galactose tolerance test. Lactase activity in the jejunal mucosa was markedly decreased by neomycin ingestion in 4 subjects, and was unaltered when neomycin was added in vitro. Lactose, glucose and galactose were found in the feces by thin-layer chromatography in 9 of 10 subjects given neomycin. Kanamycin did not produce a change in either the lactose tolerance test or the glucose-galactose tolerance test in 1 subject studied, while lactose, galactose and glucose were found in the feces of 2 patients and no saccharide was found in 2 others. In 1 patient undergoing biopsy, the mucosal lactase activity decreased during p.o. admin. of kanamycin. Neomycin was delivered to the proximal ileum by tube in 2 subjects; traces of lactose were found in the feces of both and 1 also had traces of galactose. In 2 patients in whom a formula diet was used to allow the replacement of lactose by glucose, chromatography revealed glucose and galactose in the feces of both subjects during lactose and neomycin admin., but substitution of glucose yielded no sugar in 1 and only faint traces of glucose and galactose in the other. These results demonstrate reversible inhibition of lactase activity and of monosaccharide absorption during admin. of neomycin p.o., and similar, but less marked, effects of kanamycin. This effect of neomycin suggests that widespread mucosal damage contributes to the malabsorption induced by this antibiotic.

10405 MEDIUM CHAIN TRIGLYCERIDES (MCT) IN THE TREATMENT OF PROTEIN-LOSING ENTEROPATHY AND MALABSORPTION SYNDROMES. (E.) Jarnum, S. (State Hosp., Copenhagen) and H. Jensen. Scand. J. Gastroent. 1(4):306-313, 1966.

A total of 18 patients (7 males, 11 females; 6 mo.-58 yr. old) with protein-losing enteropath and other malabsorption syndromes were treated with a low-fat diet supplemented with medium-chain triglycerides. In 4 of 5 cases with prote losing enteropathy, a noticeable improvement of protein loss and steatorrhea occurred; improvement was slight in the fifth patient who had no steatorrhea. In 9 patients with steatorrhea secondary to pancreatic insufficiency (3 cases, including 1 with carcinoma of the pancreas and 2 with chronic pancreatitis), Crohn's disease (of the terminal ileum, 1 case), intestinal resectio (1 case), intestinal resection and blind loop syndrome (1 case), postgastrectomy and enteropat of undefined nature (1 case), sarcoidosis with mesenteric gland involvement (1 case) and genera ized mastocytosis (1 case), clinical improvement followed the institution of a medium-chain-triglyceride diet in every case, whereas steatorrhe ceased in all except 2 patients with chronic pan creatitis. In 4 patients with chronic intestina disease without steatorrhea, the beneficial effect of medium-chain-triglyceride therapy varied A low-fat diet supplemented with medium-chain tr glycerides appears to represent an important advance in the medical management of a variety of malabsorption syndromes.

10406 MALABSORPTION STUDIES IN CIRRHOSIS OF THE LIVER. (E.) Sun, D. C. H. (VA Hosp., Washington, D. C.), R. A. Albacete and J. K. Chen. Arch. Intern. Med. (Chicago) 119(6) 567-572, 1967.

The incidence and cause of malabsorption were studied in 20 patients (all males; 35-69 yr. old with Laennec's cirrhosis; 12 of 20 had severe active cirrhosis of the liver, with clinical sig of jaundice, ascites, and peripheral edema on admission, and histological findings of focal zones zones of necrosis and WBC infiltration. Mallory's bodies were found in 10 of these cases The remaining 8 cases had moderately active port cirrhosis, and in 2 there were features of Zieve syndrome. The presence or absence of steatorrhe was evaluated by fecal fat studies, that of pancreatic insufficiency by pancreozymin-secretin test, and that of small intestine disease by the D-xylose excretion test, X-ray, and p.o. jejunal mucosal biopsies. Chemical steatorrhea was foun in 10 patients; there was no evidence of primary absorption defects of the small intestine, as revealed by D-xylose tolerance test, Ba meal and mucosal biopsy studies. An abnormal pancreozymi secretin test was found in 15 of the 20 patients and in all 10 patients with chemical steatorrhea Replacement with pancreatic extracts produced marked improvement in the fecal fat excretion. These results suggest that pancreatic dysfunctio may have been the primary cause of malabsorption in the 10 patients with Laennec's cirrhosis. All of the patients of this study were alcoholic a population in which pancreatic dysfunction is common. While the interrelationship of cirrhosi and pancreatitis was not investigated, it is pointed out that both cirrhosis and pancreatitis

independently linked to the same cause, e.g.,
holism.

7 IMPAIRED INTESTINAL TRANSPORT OF PROLINE IN A PATIENT WITH FAMILIAL IMINOACIDURIA.

Goodman, S. I. (U. Colorado Med. Ctr.,
er), C. A. McIntyre, Jr. and D. O'Brien. *J.*
at. 71(2):246-249, 1967.

port is presented of diminished intestinal
rption of proline in a severely retarded
-.-old girl with renal iminoaciduria and gly-
ria; at admission, routine urine screening re-
ed prolinuria, hydroxyprolinuria and glycinuria
ne presence of normal serum amino acid levels.
biopsy was normal and there was no chemical
adiological evidence of renal disease. Urinary
rances of amino acids were normal except for
ne, which was 5% of the filtered load; hy-
yproline, which was 66% of the filtered load;
lycine, which was 35% of the filtered load.
parent (father) and 1 sibling showed definite
nuria, and the mother was at borderline
l. The patient and 3 controls were placed
identical diet, rich in gelatin, giving a
daily intake of 10.8 g glycine, 8.6 g proline
ore than 3.0 g of hydroxyproline; examination
e feces after this diet revealed normal ab-
ion of hydroxyproline and diminished absorp-
of proline (59.3 μmoles/24 hr. in feces).
atient is considered to have been heterozy-
for this condition. The results of glycine
ng suggest either increased intestinal ab-
ion, which the fecal amino acid studies did
onfirm (93.4 μmoles/24 hr. in feces after a
gelatin diet), or decreased clearance of
ne from the blood by other tissues, perhaps
ating an even more generally located trans-
defect.

FECAL FAT EXCRETION. AN ANALYSIS OF FOUR YEARS EXPERIENCE. (E.)

Raffen-
er, E. C. (U. Pennsylvania Hosp., Phila-
ia), F. D'Agostino, H. Manfredo, M. Ramirez,
Brooks and F. O'Neill. *Arch. Intern. Med.*
ago) 119(6):573-576, 1967.

esults of fecal fat determination in 149
nts during the 4-yr. period 1962-1966 are
nted; all had ingested standard diets con-
ng 90-100 g of fat/day. More than 90% of
eterminations were done on a 72-hr. or
r stool collection. Abnormality was defined
re than 5 g of fecal fat and more than 200 g
t. of stool. In total, 86 patients had more
5 g of stool fat/day and 69 had more than
wet wt. of stool/day. Of those with ab-
l fecal fat excretion, 23 had pancreatic
nction; there were 19 with chronic pancrea-
, 2 with carcinoma of the pancreas and 2
total pancreatectomy; approx. one-third
ted between 5-10 g of fat/day. Forty percent
ted more than 20 g/day; 2 of the patients
chronic pancreatitis excreted more than 60 g
cal fat/day. Twenty-three of the patients
with elevated fecal fat excretions had small intestinal dysfunction; there were 8 patients with nontropical sprue (adult celiac disease), 1 with tropical sprue, 6 with regional enteritis (Crohn's disease), 6 with varying lengths of small intestine resected and 2 with hypoglobulinemia and small intestinal submucosal infiltration with round cells. Approx. 60% of the nontropical sprue and small-intestine-resected patients excreted more than 20 g of fecal fat/day, while 60% of the patients with regional enteritis excreted less than 15 g of fecal fat/day. There were 12 patients on whom a subtotal gastric resection had been done; 75% excreted less than 15 g of fecal fat/day, and only 2 patients in the group excreted more than 20 g/day. A group of patients with varying diagnoses (malignancies, 3; undiagnosed diarrhea, 9; Fe-deficiency anemia, 3; chronic hepatitis, 2; and 1 each for thyrotoxicosis, rheumatoid arthritis, sympathicotonia, esophageal achalasia, diabetes mellitus, jejunostomy feeding, superior mesenteric artery stenosis, esophageal replacement and gastrostomy feeding; and 3 undiagnosed) excreted fecal fat which ranged as high as 45 g/day. However, more than 50% excreted between 5-10 g/day. The 9 patients with diarrhea of undetermined origin excreted less than 15 g of fecal fat/day. A correlation was found between the wet wt. of stool and the fat content; it was noted that the fecal fat content of the stool could not be predicted by the wt. of the stool and *vice versa*. Another correlation was made between the 24 hr. wet wt. of stool, 24 hr. fecal fat content and the diagnosis; it was found that neither the wet wt. of the stool nor the fat content of the stool demonstrated a definite pattern for diagnosis. In this series, while no definite diagnostic pattern, using fecal fat content and wet wt. of stool, was established, generally a heavy stool with high fat content suggested nontropical sprue or pancreatic dysfunction, while a heavy stool with low fat content suggested regional enteritis.

10409 DELAYED HYPERSENSITIVITY REACTIONS IN THE INTESTINAL TRACT. II. SMALL INTESTINAL LESIONS ASSOCIATED WITH XYLOSE MALABSORPTION. (E.)

Bicks, R. O. (U. Tennessee Coll. Med., Memphis), M. M. Azar and E. W. Rosenberg. *Gastroenterology* 53(3):437-443, 1967.

Twenty-five weaned 13-wk.-old miniature pigs were divided into 4 groups. Animals in Group 1 were skin-sensitized with 3 drops of a 2% alcoholic soln. of 2,4-dinitrochlorobenzene and fed capsules containing 5 g of a mixture of 0.1% 2,4-dinitrochlorobenzene in Orabase 3 times a wk. for 4 mo.; 5 animals in Group 2 were not skin-sensitized, but received identical doses of capsules of 2,4-dinitrochlorobenzene in Orabase. In Group 3, 5 animals were skin-sensitized to the drug, 2,4-dinitrochlorobenzene and fed plain Orabase capsules only, while those of Group 4 were not skin-sensitized and given Orabase capsules only. D-Xylose tests were conducted on the animals, and serial sections of the duodenum, jejunum and ileum were taken for histological examination. A chronic diffuse delayed hypersensitivity reaction was produced by the contactant 2,4-dinitrochlorobenzene, and it was associated with D-xylose malabsorption. The morphological lesion showed severe destruction of the villi with secondary infection in previously skin-sensitized animals. In non-skin-sensitized animals fed 2,4-dinitrochlorobenzene there was edema of the villi with round cell infiltration. Lesions were most severe in the duodenum and decreased in intensity distally. Group 1 animals had the most marked changes, and those in Group 2 were less severe; no gross lesions were noted in animals in Groups 3 and 4. Malabsorption of D-xylose was most marked in Group 1 animals. The immunological nature of the reaction was established by *in vitro* cell migration studies and by the induction of contact dermatitis after intestinal admin. An hypothesis regarding gluten-sensitive enteropathy is proposed as a human model of delayed allergy in the intestine; known gluten-sensitive patients in remission, with normal ileal histology, become acutely ill upon instillation of gluten into the ileum, with clinical symptoms and morphological changes being noted within a few hr. These facts can be interpreted as a delayed hypersensitivity reaction of the contact type occurring in the intestine of gluten-sensitive patients. An experiment in human patients is suggested to verify this hypothesis.

10410 A LIGHT- AND ELECTRON-MICROSCOPIC STUDY OF BACTERIAL INVASION IN WHIPPLE'S DISEASE.

(E.) Dobbins, W. O. III (VA Hosp., Durham, N. C.) and J. M. Ruffin. *Amer. J. Path.* 51(2):225-242, 1967.

Small intestinal biopsy specimens were obtained from a patient with a characteristic clinical history of Whipple's disease, and from 4 additional patients who were either untreated or in relapse, both before and 5-8 wk. after the start of continuous antibiotic therapy; in addition, 7 patients died, prior to the advent of antibiotic therapy, with clinically active Whipple's disease, and biopsy specimens from 4 of these were studied. Specimens were studied by both light and electron microscopy. Bacteria were found to be scattered throughout the lamina propria of intestinal biopsy specimens of the patients with clinically active disease; bacteria were in greatest conc. at villous tips just below the epithelial-cell basal lamina. The most striking finding, and one not previously reported, was the presence of myriads of bacteria within intestinal absorptive cells at villous tips; these bacteria were enclosed within large circular-to-irregular-shaped membrane-bound structures that were best called heterophagic vacuoles, which contained bacteria in varying stages of degeneration, myelin figures, numerous vesicles, glycogen and irregular dense masses. Numerous bacteria were found within macrophages and lymph channels of the single lymph inguinal node obtained from an untreated patient. Bacteria were absent from antibiotic-treated patients in clinical remission, they reappeared with clinical relapse and again disappeared with additional antibiotic
therapy. These previously unreported finding
may explain in part the malabsorption syndrom
seen in patients with Whipple's disease; it i
suggested that passage of chylomicrons throug
the lamina propria may be physically impeded
the sheer numbers of macrophages within the l
propria and by obstruction to lymphatic flow
to prominent involvement of mesenteric nodes.
The lamina propria of the small intestinal mu
appears to be particularly susceptible to bac
of Whipple's disease, and patients with this
ease may be deficient in intestinal plasma ce
Epithelial invasion probably occurs from the
propria, and the route of systemic invasion i
probably through lymphatics draining the inte
The original portal of entry of the bacteria
still unknown.

10411 CLINICAL GIARDIASIS AND INTESTINAL MALABSORPTION.

(E.) Hoskins, L.
(Boston City Hosp., Mass.), S. J. Winawer, S.
Broitman, L. S. Gottlieb and N. Zamcheck.
Gastroenterology 53(2):265-279, 1967.

Intestinal absorptive function and small inte
mucosal morphology were studied in 6 patient
fested with *Giardia lamblia*. Mepacrine effe
eliminated the parasites in all patients in w
it was used. Symptoms subsided spontaneousl
1 patient, and after mepacrine treatment in
tients coincident with elimination of the pa
1 patient died without benefit of mepacrine
apy. Functional evidence of malabsorption wa
found in 4 of 6 patients; it was improved in
mepacrine; malabsorption was more pronounced
carbohydrates than for fats. Diminished ser
levels of thiamine and folic acid in 1 patie
and vitamin B_{12} in another suggested either
cessful competition for dietary sources of t
vitamins by the parasite or their malabsorpt
during infestation. Jejunal disaccharidase
ities were depressed during infestation in 1
tient, and became normal within 10 days afte
mepacrine therapy. Two patients had abnorma
jejunal mucosal morphology of moderate or ma
degree during infestation. Repeat biopsies
1 patient with marked abnormalities returned
idly to normal after mepacrine treatment; th
other 4 patients had milder mucosal abnormal
Electron micrographs in 2 patients showed sh
microvilli. Immunoglobulin deficiency was p
in the 2 patients having the most severe mor
logical and functional abnormalities. These
studies indicate that infestation with *G. la*
produces varying degrees of jejunal mucosal
normalities that are reversed by mepacrine t
ment. These abnormalities, generally mild,
be more severe when associated with immunogl
deficiency. Successful competition by large
bers of *Giardia* for dietary vitamins and nut
essential for intestinal mucosal function ma
an important factor determining the variable
severity of the mucosal lesion.

10412 SMALL INTESTINE IN HOOKWORM DISEAS

(E.) Chuttani, H. K. (Maulana Aza

Coll., New Delhi, India), S. K. Puri and R. C.
a. Gastroenterology 53(3):381-388, 1967.

patients (all men; av. age 27.5 ± 8.6 yr.)
hookworm disease (Ancylostoma duodenale;
duration of symptoms was 9.2 ± 6.8 mo.) were
ed to assess the morphological alterations and
tional derangement caused by this parasite in
small intestine; all of the patients were
c with a hemoglobin of less than 8 g/100 ml.
ols were 25 normal healthy adults and 10 pa-
s with anemia due to bleeding hemorrhoids.
cal manifestations suggestive of malabsorption
infrequent. There was no significant dif-
ce in the mean fecal fat excretion in patients
hookworm disease (4.0 ± 1.3 g), anemia with-
arasite infestation (4.4 ± 0.44 g) and healthy
ols (3.7 ± 1.15 g), although 3 patients with
orm disease had mild or moderate steatorrhea.
ose absorption was abnormal in only 1 patient
hookworm disease. Two-thirds of the patients
hookworm disease or with anemia not due to
itic infestation revealed radiological ab-
lities of the small intestine. One-fourth of
ormal subjects and 50% of the cases of non-
orm anemia had mild (grade 1) jejunal mucosal
malities. Twenty-one of 137 patients with
orm disease had mucosal abnormalities which
grade 1 in 17, grade 2 in 2 and grade 3 in
wo groups of patients were re-investigated,
er eradication of hookworms and the second
correction of anemia without elimination of
. There were no significant changes produced
e function and mucosal appearances of small
tine by eradication of parasitic infestation
rrection of anemia. These findings suggest
hookworms per se appear to produce no major
tinal injury and almost no functional de-
ment.

NEOMYCIN FEEDING IN THE RAT: STUDIES
OF INTESTINAL ABSORPTION OF GLUCOSE
YLOSE. (E.) Broitman, S. A. (Mallory Inst.
, Boston, Mass.), D. Flint and N. Zamcheck.
. Clin. Med. 70(1):9-15, 1967.

male rats (Charles River C.D. strain) were
.91 mM (56 mg%; 58.3 mg/kg/24 hr.) of neomycin
inking water for 4 wk., and the dosage was
ed 3 times at 4-wk. intervals to a max. of
mM (448 mg%; 333.9 mg/kg/24 hr.). No ab-
lities were noted in wt. gain, in xylose ab-
ion, or in morphology of the small intestine.
ls fed 0.91 mM neomycin for 1 yr. showed no
e in glucose absorption during perfusion of
mall intestine when compared to a control
. However, in animals fed only pellets and
, the addition of neomycin to the perfusate
level of 1.2 mM enhanced glucose absorption
-36%. Increasing the conc. to 6.0 mM had no
, while 12.0 mM of neomycin reduced glucose
tion by 12%. It is suggested that the dis-
nt findings of neomycin on absorption are
ed to dosage and the readily reversible ef-
on the mucosal cell surface.

10414 ELECTRON MICROSCOPY OF JEJUNAL MUCOSA IN WHIPPLE'S DISEASE. (Por.) Nagle, G. J. (Fed. U. Rio de Janeiro, Brazil). Arq. Brasil. Med. 54(1):4-15, 1967.

10415 NEW ETIOLOGIC CONCEPTS OF WHIPPLE'S DISEASE. (Sp.) Caroli, J. and C. Julien. Prensa Med. Argent. 53(1-8):251-265, 1966.

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10428 ABSORPTION AND MALABSORPTION OF LAC (Fr.) Girardet, P. Berne, Huber 1965, 98pp., $3.75.

10429 NUTRITIONAL ASPECTS OF GASTRIC SURC (E.)(Rev.) Welbourn, R. B. (Roy. Postgrad. Med. Sch., London) and J. Spencer. Rev. Surg. (Phila.) 24(4):233-242, 1967.

See also abstract nos.: 10141,10524

30 CLINICAL COURSE, LATE RESULTS, AND
PATHOLOGICAL NATURE OF INFLAMMATORY
EASE OF THE COLON INITIALLY SPARING THE REC-
. (E.) Korelitz, B. I. (Mt. Sinai Hosp.,
York, N. Y.). Gut 8(3):281-290, 1967.

course of 94 patients (40 men, 54 women)
inflammatory disease of the colon sparing
rectum was analyzed after a mean follow-up
4 yr. (range of 4-36 yr.). The mean age at
t (21 yr., with a range of 8-60 yr.) was
ger than in a comparable series of cases of
rative colitis involving the rectum. The
incidence of internal fistula formation,
rectal suppuration and ulceration, skip areas,
both rectal and colonic strictures supported
oser relationship to regional ileitis than to
rative colitis. Presence of blood in the
l was less common, whereas massive hemorr-
was more common. Complicating arthritis,
tis, nephrolithiasis and erythema nodosum
a higher incidence than in ulcerative
tis, while free perforation occurred less
uently, toxic dilatation rarely and there
no case of colonic carcinoma. Altogether,
were treated without operative intervention,
fly with adrenal steroids; medical therapy
successful in only 16%, although surgical
rvention was postponed for a mean of 3 yr.
he others. Major surgery was performed in
the most common indications were abdominal
or abscess, internal fistulae and colonic
ruction. These patients required a total of
operations, including 165 major procedures,
v. of 3.8 operations/patient. Surgical
ality rate was 14.2%. An ileocolostomy with
ithout resection was done in 66% of the
ents; almost 50% of these later required
stomies, while the remaining 33% had ileo-
ies from the onset. Extension of the disease
ne rectal segment occurred in 15%, un-
oked by surgical intervention, and in 54%
r colonic resection; there was proximal
nsion of the disease to the new terminal
n in 40% after colonic resection. The time
l distal extension varied from mo. to 14 yr.
n, 3 yr.) and with proximal extension, from
to 11 yr. (mean, 4 yr.). At the time of
ow-up, 63% were well, 25% had recurrent
toms or complications, and 12% had died. Of
urgical cases, 47% had ileostomies and 37%
internal anastomoses, including 5 with re-
tomoses. Involvement of the terminal ileum
nflammatory disease of the colon initially
ng the rectum clearly carried a worst
nosis than when the disease was confined to
colon. A diagnosis of granulomatous disease
nade in 72% of the surgical cases; the
nder were considered to be ulcerative
tis. The diagnostic value of clinical and
ological features in determining the patholo-
nature of the disease was evaluated. If
disease was both clinically and radiologically
rative colitis, it proved to be pathologically
lomatous in 65% of the cases; if it was
clinically and radiologically granulomatous, it proved to be granulomatous in 88% of the cases.

10431 DELAYED HYPERSENSITIVITY REACTIONS IN THE INTESTINAL TRACT. I. STUDIES OF 2,4-DINITROCHLOROBENZENE-CAUSED GUINEA PIG AND SWINE COLON LESIONS. (E.) Bicks, R. O. (U. Tennessee Coll. Med., Memphis), M. M. Azar, E. W. Rosenberg, W. G. Dunham and J. Luther. Gastroenterology 53(3):422-436, 1967.

Contactant reactions to 2,4-dinitrochlorobenzene in the guinea pig (Hartley strain, both sexes) was found to be transferred by sensitized cells to a nonsensitized recipient animal; the serum of such sensitized guinea pigs did not transfer the lesion. The reaction was specific for the chemical used (2,4-dinitrochlorobenzene) and did not carry over to a closely related skin sensitizer, trinitrochlorbenzene (picryl chloride). Primary intestinal sensitization was demonstrated in vivo by the development of a positive contact dermatitis after intestinal inj. of the sensitizing conjugate. Sensitization was demonstrated in vitro by inhibition of cell migration with clumping, when cells were exposed to dinitrophenyl conjugates. A similar reaction was produced experimentally in the colon of weaned miniature swine; animals were skin-sensitized to 2,4-dinitrochlorobenzene and this chemical was instilled in an adhesive paste through a colostomy. The lesion produced consisted of mucosal ulceration and hemorrhage, fibrin deposition, edema, small lymphocyte and mononuclear cell infiltration, giant cell formation in the submucosa and vascular congestion with perivascular cuffing. A similar but less intense lesion was produced by prolonged primary contact of 2,4-dinitrochlorobenzene with the mucosa of the colon without prior skin sensitization; skin sensitivity developed in 3 of 4 animals sensitized by direct application of the chemical to their colon. No relationship between circulating antibodies to 2,4-dinitrochlorobenzene and tissue damage was present. Chemical irritation was shown to be unlikely by the use of trinitrochlorbenzene in isolated loops of animals skin-sensitized to 2,4-dinitrochlorobenzene. The inhibition of in vitro cell migration of sensitized cells also confirmed the presence of cellular allergy. Primary intestinal sensitization seems to be dependent upon the ability of the inducer to remain in contact with the mucosal surface. Skin specific protein carriers were found to be unnecessary for inducing the colon lesion. This delayed hypersensitivity colonic reaction is an animal model which may have application to the study of human ulcerative colitis.

10432 IN VIVO MAGNIFICATION ARTERIOGRAPHY OF THE BOWEL WALL. (E.) Bosniak, M. A. (Boston City Hosp., Mass.), L. F. Williams, Jr.,

LIBRARY U. OF I. URBANA-CHAMPAIGN

C. A. Hasiotis, J. J. Byrne and J. H. Shapiro. Amer. J. Surg. 114(3):359-362, 1967.

The technic utilizes photographic magnification arteriography and is based on the principle that radiography giving extremely fine details can be accomplished by use of direct object-film contact. If fine grain (industrial) film and a fractional focal spot X-ray tube are utilized, photographic magnification of 5-10 times the obtained radiograph is possible. Visualization of vessels with an intraluminal diameter as small as 25-50 µ is accomplished. Several examples of visualization in the loop of small intestine of the dog are given; after 60 min. of occlusion of the superior mesenteric vein, marked spasm of vessels and poor filling of smaller branches was seen; after embolization of the mesenteric vessels with microspheres of 50 µ diameter, occlusions of the smaller vessels by the microemboli were demonstrated; and after embolization of the mesenteric vell vessels with microspheres of 150 µ diameter, occlusion of larger vessels was seen, as well as perfusion of contrast media into tiny capillaries in the intestinal wall at points of obstruction. It is thought that use of this technic will lead to a further understanding of various ischemic patterns of the intestines.

10433 VOLVULUS OF THE ASCENDING COLON. A REPORT OF TWENTY-TWO CASES. (E.) Krippaehne, W. W. (U. Oregon Med. Sch., Portland), R. M. Vetto and C. C. Jenkins. Amer. J. Surg. 114(2):323-332, 1967.

Cases (13 women, 9 men; 24-93 yr. old; av. age, 67 yr.) of cecal volvulus in a geriatric hospital population are presented. The diagnosis was primarily derived from patterns determined by radiology. Most commonly, colonic distention appeared to precipitate the volvulus in patients, with an anatomic arrangement conducive to volvulus. History of the patient's illness revealed rectal bleeding in 4, distention in 19, nausea and vomiting in 13, obstipation in 10, constant pain in 9 and colic in 8; physical examination revealed a mass in 4, tender abdomen in 18, obstructive intestinal sounds in 6 and distention in 18. Duration of symptoms ranged from 16 hr.-3 wk. The background for distention evolved into several patterns, including distal obstruction (in 8 patients, the cause of obstruction was due to cancer, diverticulitis, hernia, a tight colostomy and fecal impaction), colonic atony, and swallowed air. The sequence of events leading to volvulus in this series was apparently as follows 1) existence of a mobile cecum; 2) a fixed point around which rotation could occur; 3) distention of the colon; 4) distention of the cecum; and 5) rotation upwards and usually to the left, forming a closed loop in most cases. A history of previous episodes was present in 2 of the patients. In a third of the patients the cecum was folded upward over bands across the ascending colon. Twenty of 22 patients were operated upon; 8 died within 30 days of operat the av. age among these patients who died was 76 yr., and there were no deaths in patients less than 60 yr. of age. Seven of the 8 opera deaths were in patients in whom cecal volvulus developed while they were hospitalized for oth serious illnesses; analysis of the deaths revealed that the condition for which they were hospitalized was the apparent major cause of their death. Cecostomies were performed in 7 patients to relieve distention and fix the cec in 1 case massive gangrene of the abdominal wa followed and was the major contributing factor the death of the patient. In another case, secondary closure was necessary for persistent fecal fistula. Cecopexy was performed in 2 patients; both died without recurrence of the volvulus, the cause of death being due to unrelated disease.

10434 VOLVULUS OF THE CECUM. (E.) Peters H. I. (U. Goteborg, Sweden). Ann. Surg. 166(2):296-299, 1967.

In Göteborg, Sweden (a city with 400,000 inhabitants and only 1 large emergency hospita 11 cases of cecal volvulus (6 men, mean age 57 yr., and 5 women, mean age, 45 yr.) were diagn during the 10-yr. period, 1955-1964. This represented 1% of all cases with intestinal obstructions and 16% of cases with intestinal volvulus. Signs and symptoms were those associated with intestinal strangulation; a fi pre-operative diagnosis was made in 6 of 7 patients submitted to X-ray examination. Ther were 3 cases of gangrenous cecum, and 8 of nor gangrenous cecum. Duration of symptoms was 1- days, and 4 patients had a history of previous abdominal surgery. Treatment was operative ir 10 patients. Of those with gangrenous cecum, had a right hemicolectomy. Of 8 with nongangrenous cecum, 1 each had right hemicolecto detorsion and cecopexy, cecopexy only, detorsi and transverse colostomy, detorsion and cecostomy and laparotomy without cecopexy, while 2 had detorsion only. In 3 cases, spontaneous detorsion occurred during preparation for operation. One patient was moribund upon admission, and no operation could be performed; second died 2 wk. after operation from pulmona embolism. There were no recurrences at follow up 2-11 yr. after operation, including 2 patie in whom only detorsion was done and who were followed for 10 and 11 yr. In cases of nongangrenous cecum, the recommended operation is lateral cecostomy with fixation of the cecum a ascending colon to the lateral abdominal wall

10435 DESMOIDS OF THE ANTERIOR ABDOMINAL WALL IN PATIENTS WITH DIFFUSE POLYPO OF RECTUM AND COLON. (Rus.) Rivkin, V. L. (Proctol. Res. Lab., Moscow) and P. F. Kalite Vop. Onkol. 13(2):38-41, 1967.

Ten of 65 patients operated on for diffuse po posis of the rectum and large intestine

loped desmoid fibromas on the anterior
minal wall; in 8 they appeared after surgery
either malignant polyposis or for cancer on
basis of intestinal familial polyposis
ified in 7 of 10 patients). A 47-yr.-old
developed, 2 yr. after surgery, adeno-
llomatous familial diffuse polyposis of the
um and large intestine with malignant polyps
he sigmoid and transverse colon, a fast grow-
tumor which reached the size of a child's
in 1 yr. Due to pain, chills, and weakness,
. after observation, a resection at the site
luctuation resulted in slight excretion of
A tampon with Vishnevskii's ointment was
ed. However, symptoms of peritonitis
loped on the same day and he died 7 days
r surgery. Autopsy revealed desmoid fibroma.
27-yr.-old woman, 2 yr. after abdomino-anal
ction of the rectum for cancer on the basis
amilial diffuse adenopapillomatous polyposis,
pidly growing desmoid fibroma developed on
abdominal wall in the region of postsurgical
. In the remaining 8 patients a tumor (or
iple tumors in 5 persons) of that location
a benign course. Surgery, X-ray, or chemo-
apy are ineffective in treatment of desmoid
omas. Therefore, desmomas of the abdominal
in patients with diffuse polyposis of the
um and large intestine, represent serious
at times, life-endangering postsurgical
lications. The etiology of desmoid fibroma
nknown and possible causes are discussed.

5 DIVERTICULITIS COLI: A SURGICAL
APPRAISAL. (E.) Asch, M. J. (Columbia
lew York, N. Y.) and A. M. Markowitz.
ery 62(2):239-247, 1967.

nselected series of 209 patients undergoing
ation for diverticulitis coli in a 10-yr.
od is reported; there were 107 women, av.
61.5 yr., and 102 men, av. age 59.7 yr.
e were 116 patients with prior episodes and
no presented for surgery without a history
estive of prior diverticulitis. Signs and
toms included abdominal pain alone in 171
, nausea and vomiting in 13 (6%), abdominal
with palpable mass in 36 (17%), constipation,
8%), diarrhea, 44 (21%), genitourinary,
2%), intestinal obstruction, 24 (11%),
ated WBC and fever, 86 (41%) minor bleeding,
4%) and major bleeding, 23 (11%). Indications
urgery included recurrent attacks in 54
%), perforation in 48 (23.1%), fistula in
bleeding in 23, carcinoma of the colon in 18,
tinal obstruction and abdominal mass in 12
and questionable appendicitis and mis-
neous in 9 and 10, resp. The 2 groups with
most frequent operations were 82 undergoing
oid resection (with or without cecostomy)
4 undergoing the common 3-stage procedure
olostomy, sigmoid resection and colostomy
re. Among the patients, 119 had uncompli-
postoperative courses and 91 patients had
complications, for a complication rate of
. Complications included wound infection
in 27 (12.9%), ileus in 14 (6.7%), pulmonary (significant atelectasis or pneumonia) in 13 (6.2%), urinary tract infection in 11 (5.2%) fecal fistula in 9 (4.3%), cardiovascular (cerebrovascular accident, failure, infarct, arrhythmia) and wound dehiscence in 6 each (2.9%), fever of unknown origin, pelvic abscess, thrombophlebitis and pulmonary embolus in 4 each (2.0%) and others, 39 (18.6%). There was a total of 14 patients who died, for an operative mortality of 6.7%; 7 of the deaths occurred in patients undergoing resections (mortality rate of 3.5%) and 7 occurred in patients who had transverse colostomies only and died during the postoperative period. The av. age at death was 72.6 yr. No death occurred in 55 patients undergoing elective resection for recurrent attacks. The morbidity in this series was considerable, with a 45-day av. patient stay and a 43% complication rate.

10437 SURGICAL MANAGEMENT OF DIVERTICULITIS OF THE COLON. (E.) Wychulis, A. R., O. H. Beahrs and E. S. Judd. Surg. Clin. N. Amer. 47(4):961-969, 1967.

A total of 152 cases (85 men, 67 women; 30-84 yr. old) of diverticulitis treated surgically over the 3-yr. period 1955-1957 are reviewed. The cases were divided into 2 groups: 75 cases of diverticulitis without, and 77 cases of diverticulitis with significant complications. Among 75 without complications, the av. duration of symptoms was 5.3 yr.; among these the symptoms included abdominal pain in 71, abdominal tenderness in 48, fever in 34, abdominal mass in 33 and rectal bleeding in 28. Among those with complications, abdominal pain occurred in 73, abdominal tenderness in 50, fever in 52, abdominal mass in 31 and rectal bleeding in 15. Significant preoperative complications in 77 cases included obstruction in 51, abscess of mesocolon in 47, fistula in 32 and perforation in 2. Ba enema examination revealed diverticulitis in 85, and fistulas were identified in 9 cases. Diverticulitis involved the sigmoid in 136 cases and extended up into the distal portion of the descending colon in many cases; other sites of involvement included the descending colon in 6, the rectosigmoid in 5 and transverse colon in 1. Most indications for surgical treatment were multiple, but chief among them were recurrent diverticulitis in 85, fistula in 32 and single attack of acute diverticulitis in 13. One-stage resection was done in 117 (76%) patients, and an additional 8 (5%) had a resection of the lesion and anastomosis but with a complementary colostomy that required a second operation for closure. Of the 152 patients, 136 were traced for 1-11 yr., the av. being more than 9 yr. The results of surgical treatment were no symptoms in 119 (87%), indeterminate pain in 9 (7%), persisting fistula in 2 (1%), and recurrent diverticulitis which was mild in 1 (1%) and with which required surgery in 5 (4%). Of the 4% who required further surgery for recurrent diverticulitis, the result was satisfactory in all. The overall mortality was 2.6% (4 of 152). During the period of this study, an additional 7 patients (4 men, 3 women; 57-86 yr. old) were seen who had adenocarcinoma of the large intestine coexisting with diverticulitis; in each case, the site of diverticulitis was in the sigmoid and proximal to an obstructing malignant lesion. Operative procedures performed on these 7 included primary resection and anastomosis without colostomy in 3, with cecostomy in 1, and 1 each for abdominoperineal resection, abdominal resection with permanent colostomy and abdominoperineal resection with preservation of the anal sphincters. Three died of metastatic disease 2 mo.-2 yr. postoperatively; 4 had no further symptoms attributable to diverticulitis or carcinoma when last seen at 5, 7, 8 and 9.5 yr. postoperatively, resp.

10438 SOLITARY ULCER OF THE CAECUM. (E.) Maynard, J. (Guy's Hosp., London). Guy Hosp. Rep. 116(1):39-49, 1967.

The relationships of solitary ulcer, solitary diverticulum, benign tumor, and malignancy of the cecum are reviewed from the literature, from the gross and histologic comparison of 2 museum specimens described as solitary diverticula and 2 museum specimens designated as solitary ulcers, all of the cecum, and from the critical evaluation of gross and microscopic material from 4 cases. These cases include 3 men and 1 woman (39-64 yr. old) who underwent right hemicolectomy, 3 for apparent ulcer in a highly inflamed state and the fourth for a supposed carcinoma. Whole histological sections, cut at right angles to the cecal wall, 2 of the apparent ulcers to be inflamed diverticula with complete mucosal lining; in the third the mucosa of the floor of the diverticulum showed evidence of breaking down; and in the fourth, although the mucosa of the lateral walls was intact, the mucosa of the floor was missing. The comparative frequency with which carcinoma of the cecum presents an inflammatory mass makes diagnosis of a benign lesion both difficult and dangerous. In the cecum the likelihood of carcinoma is much higher and rare benign ulcers present emergencies which require surgery; cecal ulcers rarely give rise to symptoms unless they are inflamed or have perforated. Within the limitations imposed by emergency surgery it would seem that an indurated inflammatory mass involving the cecum should be treated by immediate hemicolectomy. Perforation of such a mass should be managed in the same way.

10439 MYENTERIC PLEXUS IN HIRSCHSPRUNG'S DISEASE. (E.) Smith, B. (St. Bartholomew's Hosp., London). Gut 8(3):308-312, 1967.

Sections of colon were obtained by parallel sectioning of the intestinal wall from 2 patients, [1 male, 28 yr. old; 1 female, 26 yr. old] with congenital megacolon. Both specimens of colon measured about 40 cm in length and were obtained from the sigmoid and upper rectum. Sections were taken from the lower end, at 5 cm and 20 from the lower end and from the upper end of t colonic specimens. Histologic examination revealed an almost complete absence of ganglio cells in sections obtained from the lower 2 levels. Ganglion cells were visible at higher levels, however. The normal anatomic pattern the myenteric plexus was lost in lower section Bundles of unmyelinated nerve fibers with an abnormal wavy configuration and large numbers fine, densely packed axons were also observed these lower sections. In sections from higher levels, these bundles were broken up and individual axons were fragmented. Ganglion ce though present in greater numbers at higher levels, were often abnormal in configuration a either showed a pronounced argentophilia or we very pale in color. Some of these cells had n axons or had short branches which were irregul in thickness and randomized in orientation. S neurons were observed among bundles of unmyelinated nerve fibers. Thickened axons were observed following convoluted courses. Some axons entered into the neighboring musculatur and curved back out again, while some had ret tion balls and others showed a great irregula in diameter.

10440 MORTALITY IN NEONATAL HIRSCHSPRUNG'S DISEASE: WITH PARTICULAR REFERENCE ENTEROCOLITIS. (E.) Fraser, G. C. (Hosp. Si Child., London) and C. Berry. J. Pediat. Sur 2(3):205-211, 1967.

Hirschsprung's disease, being congenital, alm invariably shows itself in some way during th neonatal period. In the first mo. of life mortality is in excess of 30%. Postmortem examination of a series of 21 infants with th disease showed that intestinal mucosal change were present. In 4 of 10 patients operated u there developed a sudden circulatory collapse within 48 hr. following successful surgery. 3 more patients who survived surgery there wa gradual decline with wasting, wound breakdown and the development of multiple septic areas- features which have been collectively termed "septic disintegration." Of 7 patients given initial conservative treatment 4 died as a result of mishaps during their early course: 1 infant survived to undergo additional surgery and the remaining 2 children gradually declin as described previously. Preliminary experim data suggests that the pathogenesis of entero colitis resembles that of the localized Schwartzman reaction. Prompt surgery on all newly born infants with Hirschsprung's diseas is required and the bowel should be biopsied only to determine the absence of ganglion cel but to inspect the mucosa as well.

10441 EXPERIENCE WITH THE USE OF INVAGINA SMALL AND LARGE INTESTINE ANASTOMOS AT DIFFERENT LEVELS OF THE LARGE INTESTINE.

;.) Vitebskii, I. D. (Dept. Surg, Kurgan
ional Hosp., USSR). Sovet. Med. 29(12):
51, 1966.

n 1947-1965, 3 variants of the small-large
estine anastomosis were performed on 122
ients with various benign and malignant
eases of the intestines, mesenterial throm-
is and impaction of herniae; the variants
luded 1) terminal invaginating small-large
estine anastomosis; 2) invaginated end-to-
e anastomosis of Kimbarov; and 3) invaginating
nsversal end-to-side anastomosis (the author's
ification) imposed 8-12 cm from the end of
stump of the large intestine. Small and
moid intestine anastomosis in 3 patients was
ording to the side-in-side variant in 1 (1
d), side-in-end in 1 and by the author's
ification in 1. Ileocecal anastomosis in 19
by the side-in-side variant in 11 (5 died),
the Kimbarov technic in 3 (1 died) and by the
hor's modification in 5 (none died). Small
estine anastomoses with the ascending and
atic angle was by the side-in-side variant in
l died). In 96 cases, the small and trans-
sal-colonic intestine anastomosis was by the
e-in-side variant in 57 (11 died), end-in-end
l, by the Kimbarov technic in 16 (2 died) and
the author's modification in 22 (5 died).
-third of the patients with a side anastomosis
d from peritonitis due to faulty sutures; one-
rd who died after the Kimbarov anastomosis
wed faulty sutures, while no one of the pat-
ts who died after anastomosis by the author's
ification showed faulty sutures. The best
g-term results also were obtained using the
hor's modification. Further surgery after side
stomosis was necessary in 4 cases (due to
minal ileitis in 3, or due to syndrome of the
rimal sac with partial intestinal obstruction
l). Therefore, transversal invaginating anas-
osis by the author's modification led to the
mation of a valve arrangement which prevented
erse entrance of the large intestinal content
o the small intestine. In addition, reconstruc-
n of the ileocecal angle function was also rea-
ed by this method. Three case histories (4 mo.,
r. and 64 yr. old, resp.) are given in detail.

42 COMBINED ABDOMINOENDORECTAL RESECTION: REAPPRAISAL OF A PULL-THROUGH PROCEDURE.
) Black, B. M. and J. T. Walls. Surg. Clin.
Amer. 47(4):977-982, 1967.

e (3.2%) of the 157 patients died; 2 from pseu-
embranous ulcerative ileocolitis, 1 each from
ertensive congestive heart failure and pulmonary
olism and 1 from peritonitis ultimately compli-
ed by pulmonary embolism. Complications includ-
l case each of nonfatal pulmonary embolism,
umonia and myocardial infarction. In 2 cases,
arcerated hernia required repair in the immedi-
postoperative period. Dehiscence of the
sion requiring closure occurred in 3 cases
3 developed superficial thrombophlebitis;
abdominal incision became infected in
7 cases. Of 101 surviving men, 26 required transurethral prostatic resection. A minor pelvic abscess developed in 23 patients. Sloughing of the end of the intestine that was pulled through the anorectal canal occurred in 27 cases; in 11 cases (7%), the slough extended to above the level of the stump of the rectum. Of 152 surviving patients, 2 were left with a permanent colonic stoma and in 3 no information concerning fecal control was available. Of the remaining 147, 103 (70%) considered their fecal control to be entirely normal. Some degree of fecal control was present in an additional 25 cases (17%). Essentially no fecal control was regained by 19 patients (13%). It is concluded that combined abdominoendorectal resection is well suited for the treatment of carcinoma of the middle and upper parts of the rectum.

10443 MEASUREMENT OF CONTACT pH IN THE HUMAN RECTUM IN HEALTH AND DISEASE. (E.)
Bitterman, W. (Mayo Grad. Sch. Med., Rochester, Minn.), R. J. Spencer, K. A. Huizenga and R. G. Shorter. Gastroenterology 53(2):288-290, 1967.

Contact pH of the human rectum, measured at the surface of the mucosa, was determined in 7 groups of subjects. In 121 normal subjects (55 men, 66 women; 8.5-83 yr. old), the rectal pH was 7.9±0.067, with no differences found between the results in different decades of age nor between the sexes. Among 17 (6 men, 11 women; 17-78 yr. old) with active chronic ulcerative colitis involving the rectum (the disease had been active 2 wk.-46 yr.), rectal pH was 6.9±0.175; this was significantly different from that of the normals. In 4 patients (3 men, 1 women; 35-68 yr. old) with ulcerative colitis in remission, pH was 7.9±0.150. Of 15 patients (9 men, 6 women; 22-77 yr. old; 2 of whom had nonspecific proctitis) who had diarrhea without ulcerative colitis, the pH was 7.9±0.080. In 29 patients (16 men, 13 women; 35-77 yr. old) with 1 or more benign adenomatous polyps in the rectum, the pH was 8.2±0.070, which was significantly different from that in normals. Fourteen patients (8 men, 6 women; 36-70 yr. old) had previous local resection or fulguration of 1 or more benign rectal polyps; the pH in this group was 8.0±0.006. Of 10 patients (5 men, 5 women; 43-76 yr. old) with rectal carcinoma, pH at the normal rectal mucosa was 7.6±0.260, and at the tumor surface it was 6.9±0.330; both of these were significantly different from normal. Thirteen patients (7 men, 6 women; 45-82 yr. old) had previous resection of rectal or sigmoidal carcinoma, but had no evidence of recurrence; the pH in this group was 8.2±0.100, and this was significantly different from normals. It is speculated that the change to acidity of the pH on the surface of the rectal mucosa in active chronic ulcerative colitis and on the surfaces of the rectal carcinomas probably was a reflection simply of damaged tissue, since tissue damage is associated with a decrease in pH.

10444 CARCINOMA OF COLON AND RECTUM: DIAGNOSIS AND TREATMENT. (E.) Shackelford, R. T. (Johns Hopkins U. Med. Sch., Baltimore, Md.). J. Louisiana Med. Soc. 119(4): 137-146, 1967.

An evaluation of the technic of a synchronous combined abdominoperineal resection of the rectum with preservation of the sphincter is presented. When the best procedure (abdominoperineal exposure with preservation of the anal canal and perineal suture anastomosis of the descending colon to the anal stump) was used in 27 cases it was complicated by a perineal fistula in 9. An operation, evolved from experiments on dogs, for carcinoma of the upper and midrectum employs the 2-team synchronous approach of Lloyd-Davies, the intra-abdominal dissection of Miles combined with the posterior Kraschke approach with sphincter preservation as employed by Best and the pull-through type of coloanal-stump anastomosis used by Block. The operation is described in detail with illustrations. After healing, the patient is discharged from the hospital with a functioning colostomy. After 6-12 wk. when digital examination of rectum, proctoscopy and Ba enema X-ray study have revealed a well-healed anastomosis with a pliable lumen of adequate caliber, the colostomy is closed. This operation has been performed on 15 patients with no operative deaths; 2 died of cancer, one 4 mo. after colostomy closure during which time he had normal anal function. The other had evidence of a rapidly growing cancer so soon after the operation that colostomy closure was not attempted. Another is alive after 1 yr. with recurrent cancer which is being treated by radiotherapy. Except for a fistula in 1, of 12, these have had an uncomplicated postoperative course without evidence of cancer. In all cases sphincter control has been normal. Routine proctoscopic examination of asymptomatic patients over 40 yr. old reveals unsuspected adenomatous polyps or carcinomas in 6%.

10445 VESICOCOLIC FISTULA--A COMPLICATION OF COLONIC CANCER. LONG-TERM RESULTS OF ITS SURGICAL TREATMENT. (E.) Aldrete, J. S. (Mayo Clin., Rochester, Minn.) and W. H. ReMine. Arch. Surg. (Chicago) 94(5):627-637, 1967.

Record analysis of 42 patients (28 men, 14 women) with vesicocolic fistulae is reported. In each patient histopathology had confirmed cancer of the colon and in 38 of them a fistulous communication between the colon and the urinary bladder could be shown by examination of resected surgical specimens. Colonic symptoms occurred in 330/42 while urinary symptoms showed in 40; this was mainly dysuria but 29 showed gross hematuria, 18 pneumaturia and 10 fecaluria. Associated conditions were cardiovascular and renal diseases, polyposis of colon, syphilis, severe diabetes and cancer of the ovary. Urine culture showed Escherichia coli (61%), Streptococcus faecalis (36%) and other gram-negative organisms.
Diagnosis confirmation was through cystoscopy,
proctoscopy and X-ray studies of the colon.
Fistulae were caused by cancer in the sigmoid
colon in 34 patients, in the rectum in 4 and
the cecum in 4. Three of the 42 patients were
operated upon for recurrent malignant colonic
disease and 39 had operations for primary trea
ment of colonic cancer. There were complicati
in 19% involving ventral hernia, pulmonary
embolism, obstruction of the small intestine,
vesico vaginal fistula, fecal fistula, stenos
of uterovesical anastomosis and severe wound
infection; one in each patient. The overall
5-yr. survival rate was 24%.

10446 DIAGNOSIS OF LARGE-BOWEL CANCER IN
ASYMPTOMATIC PATIENT. (E.) Greego
D. H. (Mt. Carmel Hosp., Columbus, Ohio). J.
201(12):943-945, 1967.

In 2000 physical examinations performed in an
internist's office, 7 patients with invasive
carcinoma of the colon were found. None of t
patients in the survey was examined because o
large-intestinal symptoms. All of the 7 pati
had positive tests for occult blood in at lea
1 of 3 stool specimens. This finding led to
preparation of an easier method for multiple
stool examination as a routine office procedu
Recent reports have tended to emphasize the
limitations of the sigmoidoscope in cancer
detection. If a positive reaction is obtaine
from a multiple stool occult blood test, the
patient should be examined further with bariu
sulfate enema roentgenograms. This is one of
the best methods for detecting large-intestin
cancer during routine well-patient examinatio

10447 IMPROVING THE PROGNOSIS FOR PATIENT
WITH INTESTINAL CANCER. (E.)
Gilbertsen, V. A. (U. Minnesota Med. Ctr., Minneapolis). Surg. Gynec. Obstet. 124(6): 1253-1259, 1967.

Cancer of the large intestine is the most com
visceral cancer, and has caused more deaths d
ing the past 25 yr. than any other neoplastic
disease; more than 50% of patients with this
cancer die of the disease. Improvement in pr
gnosis for patients with cancer of the colon
rectum has resulted because of efforts to mak
definitive treatment available for a larger
percentage of patients, greater use of more
adequate operative procedures for patients wi
more extensive cancers, and the treatment of
patients more promptly after onset of the dis
Introduction of the Miles abdominoperineal
resection is one of the most recent significa
improvements in operative procedures for canc
of the rectum. Further improvement in result
has accrued from the use of incandescent
illumination, blood transfusion, improved
anesthesia and other surgical adjuvants. A
gradual increase in the proportion of patient
undergoing excisional procedures is related t

itional improvement in overall survival rates
ing the previous 50 yr. Prognostic improve-
t associated with minimizing of delay in
atment offers the most hopeful area for a
nificant increase in overall rates of survival;
av. patient with intestinal cancer continues
delay at least 6 mo. from the onset of symp-
s until the time of therapy, and lessening of
s delay would appear to have a direct effect
prognostic improvement for a substantial per-
tage of these patients. Even more promising
the effect on survival rates which has resulted
m the detection and treatment of intestinal
cers before such lesions enlarge sufficiently
cause recognizable symptoms of their presence;
the 66% of patients with cancers of the colon
rectum which arise from the distal 25 cm of
estine, annual proctosigmoidoscopy may
minate death from this disease.

48 THE PROGNOSTIC SIGNIFICANCE OF CHROMOSOME ABNORMALITIES IN COLON TUMORS. (E.)
s, H. A. (Yale U. Sch. Med., New Haven, Conn.)
S. Kotler. Ann. Intern. Med. 67(2):328-336,
7.

chromosome complements of 11 primary tumors
metastatic adenocarcinomas, 3 non-metastatic
nocarcinomas, 3 villous adenomas, and 1
enomatous polyp) of the large intestine were
termined. In each of the 10 patients with
lignant or premalignant lesions, chromosome
normalities were present, but the chromosome
plement of a benign adenoma was normal. An
rocentric chromosome, intermediate in size
tween Groups 13-15 and 21-22, was present in
least 3 of the 7 malignant tumors and may
ve represented a significant marker chromosome
adenocarcinomas of the colon. Three subgroups
th distinctive clinical and cytogenetic fea-
res were identified. All of the 4 metastatic
enocarcinomas contained cells with more than
chromosomes; in 3 of these, a predominant cell
ne containing more than 60 chromosomes was
esent. The 3 nonmetastatic colon carcinomas
owed counts ranging only from 44-49, with
edominant cell lines ranging from 46-48. Each
the 3 villous adenomas was characterized both
the absence of marker chromosomes and by the
ck of a predominant cell line. It is suggested
at adenocarcinomas of the colon whose cells
ve high chromosome numbers are more likely to
tastasize than those with chromosome numbers
ose to 46.

449 X-RAY VISUALIZATION OF RECTAL CARCINOMA AFTER INTRAVENOUS INJECTION OF POLY-
NYLPYRROLIDONE (PVP): PRELIMINARY REPORT.
.) Bodkin, L. G. Dis. Colon Rectum 10(3):
7-204, 1967.

ternating inj. of polyvinylpyrrolidone with
and Fe into the arm veins of patients with
ectal carcinoma resulted in visualization of
aque shadows on flat plate X-rays. It is suggested that the deposits observed radiologically are the result of precipitation of Bi by the more active Fe. In patients who received only polyvinylpyrrolidone, the outlines of malignant lesions were distinct, whereas in patients who received other forms of i.v. admin., the borders of the lesions were somewhat indefinite. The lack of toxic reaction to repeated i.v. inj. of polyvinylpyrrolidone was noted. Three cases of rectal carcinoma are described in which this technic was employed. These involved a 58-yr.-old man with advanced carcinoma of the descending colon; a 52-yr.-old woman with carcinoma of the rectosigmoid and a 61-yr.-old man with carcinoma of the rectum and suspected involvement of the sigmoid flexure (confirmed at subsequent abdominoperineal resection). It is suggested that this technic may prove valuable in the early diagnosis of carcinoma of the colon and rectum.

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erative colitis usually begins in the rectum extends proximally, sometimes eventually olving the entire colon; it can be diagnosed ctoscopically in over 90% of the patients. A mal rectum with severe disease is very ommon, and represents a significant barrier the prompt establishment of a proper diagnosis. r cases of fulminant ulcerative colitis with mal rectal mucosa as observed proctoscopically discussed; all were women, 20-59 yr. old; 3 e Caucasians and 1 Negro; the latter died. case was complicated by toxic megacolon and y hemorrhage. Emergency surgery was necessary 2 cases, with the 1 death resulting; elective gery was performed on 1 patient. Tissue ained in 3 of the 4 cases was typical of erative colitis, with no granulomata, trans-al invasion, deep ulceration, or involvement adjacent lymph nodes. The Ba enema examina-on was the most useful diagnostic tool, even en performed during the acute episode.

519 ULCERATIVE COLITIS CONFINED TO THE RECTUM AND SIGMOID FLEXURE: REPORT OF 4 CASES. (E.) Farmer, R. G. (Cleveland Clin. und., Ohio) and C. H. Brown. Dis. Colon Rectum (3):177-182, 1967.

cerative colitis confined to the rectum and gmoid flexure was studied in 124 patients 8 men, 46 women; age at time of diagnosis nged from 7-75 yr.) who had normal X-rays of e colon. Follow-up information was obtained on 0 patients; 63 were followed for periods nger than 5 yr., the mean period being 6.2 yr. e major symptom was rectal bleeding, which was e primary complaint in 123 patients. Diarrhea curred in 107, 75 of whom had 2-5 loose stools ily, and 32 more than 5 loose stools in a 24-. period. Other symptoms included abdominal amping (rarely severe) in 60, wt. loss of 10 or re pounds in 15 (19 others had lost less than pounds), anal fissures or fistulas in 12, eumatoid arthritis in 2, and uveitis and ythema nodosum in 1 each. The mean duration f symptoms was 3 yr., but the majority of atients (76) had continuous symptoms for less an 6 mo. Sigmoidoscopic findings were ndistinguishable from those of ulcerative olitis affecting more extensive portions of the olon. Biopsy specimens of rectal mucosa of 21 atients were indistinguishable from those of atients with ulcerative colitis. Extension to ore proximal portions of the colon occurred in 0 patients, and the entire colon was involved n 14. Ten patients required operations, of hich 3 were abdominoperineal resections with olostomy; 5 were surgical procedures for toxic ulcerative colitis, and 2 were for carcinoma. No patient required surgical treatment solely for chronic symptoms of colitis. Therapy included sulfa enemas in 28, sulfa agents p.o. in 27, combination of sulfa agent p.o. and sulfa enemas in 20, and steroid enemas and/or steroid suppositories in 18; initial response was satisfactory in 24, 24, 15 and 17, resp., for each group. Antiamoebic therapy was used empirically in 23, with unconvincing results; no amoebae were found in the feces of any of these patients. Among 120 patients studied in follow-up, with regard to initial responses to treatment, 90 had satisfactory responses, 28 had poor responses, and 2 could not be adequately assessed; 33 had no recurrences and 3 reported normal bowel habits without rectal bleeding. Of the remaining 87 patients, 42 had mild recurrences, 28 had numerous recurrences with moderately severe symptoms, including diarrhea and loss of wt., and 17 had severe recurrences, continuous symptoms and significant debility; 7 of these had extremely severe, discrete, toxic episodes of colitis. It is concluded that ulcerative colitis confined to the rectum and sigmoid flexure is more benign and has a better prognosis than colitis involving the entire colon.

10520 ILEOSTOMY AND EXCISION OF THE LARGE INTESTINE FOR ULCERATIVE COLITIS. (E.) Daly, D. W. (Queen Elizabeth Hosp., Birmingham, England) and B. N. Brooke. Lancet 2(7506):62-64, 1967.

From 1947-1965, a total of 442 (180 men, 262 women) patients with ulcerative colitis were submitted to an operative program of ileostomy and total excision of the large intestine; in 149 (33.7%), it was an emergency procedure, and in 293 (66.3%) it was an elective operation. There were 85 deaths, 46 of which were either directly due to operation or within the period of hospital admission. Ten of the deaths occurred after elective surgery, giving a mortality of 3.4%, and occurred in older patients with ages at operation ranging between 42-68 (mean, 54). Mortality in acute cases was 24% (36 deaths after 149 operations). The most common causes of the 39 late deaths were carcinoma (15) and liver failure (7). Only 2 of the late deaths were attributed to surgical treatment and were due to obstruction. Initially, emergency operation predominated over elective surgery, but during the period of this study, this position was reversed. A random group of 100 patients (38 men, 62 women) were reviewed 5 or more yr. after surgery; although the ability to work and enjoy leisure and the state of nutrition was satisfactory in this group, an increased infertility was noted in females, and sexual disability in males. A further 62 men were interviewed, and this finding was corroborated. The cause of sexual disability apparently was technical failure in removal of the rectum. Associated disorders included cirrhosis in 3, diabetes and bronchitis in 2 each, hypertension and chronic nephritis in 1 each, and rheumatoid arthritis presenting in a woman at the age of 68, 5 yr. after panproctocolectomy. It is emphasized that cancer is a serious risk in patients with disease persisting for 10 yr., and it remains a risk if any part of the large intestine is retained.

10521 E. coli AGGLUTINATING ACTIVITY OF ULCERATIVE COLITIS SERA. (E.) Fink, S. (VA Hosp., Hines, Ill.), R. F. Mais, R. F. Locke and A. G. Hall. Proc. Soc. Exp. Biol. Med. 125(2):402-404, 1967.

Antibody titer against "B" antigens was determined in sera from 16 patients with chronic ulcerative colitis and compared with the titer in sera from 17 individuals free of gastrointestinal disease, 23 patients with advanced Laennec's cirrhosis and commercial pooled γ-globulin adjusted to physiologic conc. Eight ulcerative colitis patients were receiving salicylazosulfapyridine, and none were receiving other medication. The pathogenic strain Escherichia coli 0 119:B 14, the equivalent non-pathogenic, non-capsular strain E. coli 0 119 and E. coli 0 14 were used. Control sera agglutinated all E. coli strains tested and gave highest titers against the capsular strain 0 119:B 14; in contrast, sera from patients with ulcerative colitis showed significantly lower agglutinating titers against this organism. An increase in titer did not occur when the low titer ulcerative colitis sera was retested in dilutions of 1:500. Differences due to drug therapy or the severity of the disease were not apparent. A significant difference was not found between normal and ulcerative colitis titers against E. coli 0 119 and 0 14. Sera from patients with cirrhosis showed significantly elevated titers against E. coli 0 119:B 14 and 0 14 when compared to normal values, and similar titers against E. coli 0 119. Commercial pooled γ-globulin adjusted to physiologic conc. gave agglutination titers similar to those of the thermal-inactivated sera from normal subjects with titers of 2+ against E. coli 0 119:B 14 and 1+ against the other strains. These results show that sera from patients with chronic ulcerative colitis have normal agglutinin activity against several 0 antigens of E. coli but decreased activity against 1 capsular antigen; this is due wholly or in part to a decreased content of 19S antibodies.

10522 EFFECT OF E. coli ANTIGENS, TUBERCULIN, AND PHYTOHAEMAGGLUTININ UPON ULCERATIVE COLITIS LYMPHOCYTES. (E.) Stefani, S. (VA Hosp., Hines, Ill.) and S. Fink. Gut 8(3):249-252, 1967.

Peripheral blood lymphocytes of 20 patients with ulcerative colitis and 10 normal patients were cultured in the presence of extracts of Escherichia coli 0 119:B 14, phytohemagglutin and old tuberculin. Following 6 days of incu tion, the degree of blastoid transformation a mitosis was determined by phase contrast micr copy. Lymphocytes from all ulcerative coliti patients studied exhibited a normal reaction phytohemagglutinin and old tuberculin. Howeve those from patients with active ulcerative colitis differed from lymphocytes of patients with the disease in remission and from normal donors in their reaction to E. coli extracts. The observed absent or diminished reaction of lymphocytes from active ulcerative colitis patients was found to be independent of salicylazosulfapyridine therapy and of serum factors. The degree of reactivity varied acco ing to the change in stage of the disease for patients in whom a second study was performed.

10523 PROGNOSIS AFTER SURGICAL TREATMENT O GRANULOMATOUS COLITIS. (E.) Glotze D. J. (Tufts U. Sch. Med., Boston, Mass.), P. Stone and J. F. Patterson. New Eng. J. Med. 277(6):273-279, 1967.

In order to determine the prognosis of granulo atous colitis after surgical treatment, all cases of extirpative surgery for nonspecific inflammation of the colon at the New England Medical Center Hospitals were analyzed. Forty eight patients were considered to have ulcerative colitis, 21 had proved granulomatous coli (these had proven granulomas) and 13 had clini granulomatous colitis (these had typical clini features of granulomatous colitis when granulo were not found in the specimen). The prognosi in granulomatous colitis was not markedly different from that in ulcerative colitis when ileostomy and total colectomy was performed; 4 of 48 patients with ulcerative colitis survive operation and considered themselves well at ti of follow-up, the median of which was 6 yr., with a range of 1-24 yr. Fourteen of 15 patie with proved granulomatous colitis survived operation and were living 1-19 yr. later, with mean follow-up period of 7.5 yr. Recurrent disease was observed, however, in 4 of 7 patients after resection and anastomosis for granulomatous colitis. Dysfunction of the ileostomy was more frequent in patients with granulomatous colitis; these stomal problems occurred solely in ileostomies that had not bee matured at operation. One death resulting from progressive small intestinal disease after colectomy and ileostomy for granulomatous colitis was attributed to this complication. It is concluded that a diagnosis of granulomato colitis should not delay surgical treatment whe medical management fails to control the disease adequately.

10524 SIGNIFICANCE OF LACTASE DEFICIT IN ULCERATIVE COLITIS. (E.) Cady, A. B. (VA Hosp., Hines, Ill.), J. B. Rhodes, A. Littma and R. K. Crane. J. Lab. Clin. Med. 70(2):279-286, 1967.

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accharidase assays on biopsies of the small
estine from 32 male patients with ulcerative
itis revealed lactase deficiency in 15 (46%),
ignificantly higher incidence than in control
ients (38 of 122 had lactase deficiency); 30
the ulcerative colitis patients were Caucasian
2 were Negroes. Flat blood sugar curves and
rrhea occurred with 100 g lactose tolerance
ts in the patients with low intestinal lactase
ues; normal curves and no diarrhea were the
al result with normal lactase. All 6 patients
the first yr. of symptoms had a lactase
icit. With repeated biopsies, lactase rose in
atients with clinical improvement and decreased
2 in whom symptoms became worse. In double-
nd feeding trials with 50 or 100 g of sugar
ly in 18 patients, lactose did not increase
ptoms more frequently than glucose. The
urrence of symptoms during the feeding of
ar was not influenced by the presence or
ence of lactase deficit.

25 IMMUNOCHEMICAL AND IMMUNOELECTROPHORETIC
CHARACTERISTICS OF CRYOPROTEIN AND
IOL-GEL TEST IN THE SERA OF PATIENTS WITH
RATIVE COLITIS. (E.) Polčák, J. (Purkyne
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g 164 patients with ulcerative colitis, 118
9%) experienced aggravation of symptoms after
sure to cold. The formol-gel reaction
rding to Gaté and Papacostas was positive in
sera of 92 (68.9%) of 134 patients with
rative colitis. Cryoglobulinemia and a
ious history of aggravation of symptoms upon
sure to cold were present simultaneously in
cases. In 14 of the above-mentioned 92 cases,
cryoproteins were studied by the immuno-
trophoresis and immunodiffusion technic of
terlony; the cryoprotein was composed of 2
noelectrophoretic components, namely γ_2 and
immunoglobulins, designated also by sedimenta-
constants 7S and 19S. It is the authors'
ion that cryoglobulinemia in ulcerative
tis is an expression of increased immuniza-
processes in the body.

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10529 SIGNIFICANCE OF A SERIES OF BIOCHEMICAL INDICES IN APPRAISING PECULIARITIES MARKING THE EVOLUTION OF NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Ryzhikh, A. N. (Sci. Res. Lab. Clin. Proctol., Moscow), M. Kh. Levitan and A. V. Konsistorum. Sovet. Med. 30(7):72-77, 1967.

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10531 HISTOCHEMICAL STUDY OF THREE HYDROLYTIC ENZYMES IN BIOPSIES OF COLONIC MUCOSA IN PATIENTS WITH ULCERATIVE COLITIS. (Sp.) Simková, Z. (U. Brno, Czechoslovakia), E. Zelinková, F. Hendrich, F. Papousek and E. Cerny. G.E.N. 21(4):323-329, 1967.

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10535 SURGICAL TREATMENT OF NONSPECIFIC ULCERATIVE COLITIS IN CHILDREN. (Rus.) Vantsian, E. N. (Clin. & Exp. Surg. Sci. Res. Inst., Moscow) and I. Iu. Iudin. Khirurgiia (Moskva) 43(6):63-68, 1967.

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10536 PROTECTION OF CANINE PANCREATIC ULTRASTRUCTURE AGAINST RADIATION BY PRETREATMENT WITH ALLOXAN. (E.) Volk, B. W. (Jewish Chronic Dis. Hosp., Brooklyn, N. Y.), K. F. Wellmann and S. S. Lazarus. Amer. J. Path. 51(2):207-224, 1967.

In previous studies, the effect of single large doses of X-rays on ultrastructure of the canine pancreas resulted, during the first 3 mo. after irradiation, in widespread focal cytoplasmic degradation characterized by the presence of pleomorphic electron-dense materials, alterations of endoplasmic reticulum and mitochondria, and reduction in size and number of mature zymogen granules; after 3 mo., the lesions gradually disappeared, and after 5 mo., the ultrastructure was normalized. Pancreatic amylase, lipase and leucine aminopeptidase activities were markedly decreased. In order to study the effect of pretreatment with alloxan on these parameters, 48 mongrel dogs of both sexes were divided into 4 groups as follows: Group A: 10 dogs, given partial pancreatectomy followed by irradiation of the remaining 2 inches (approx.) of the uncinate process with 7000-9000 R; Group B, 29 dogs, treated the same as in Group A, except that each also received a single i.v. dose of 15 mg of alloxan monohydrate/kg; it was given to 12 animals at 1-6 days before operation, and to the remaining 17 at 1 hr. before operation; this was followed by a single dose of 7000-9000 R approx. 15 min. after operation; Group C, 6 dogs, first were given 15 mg/kg of alloxan i.v., and 1 hr. later the same operative procedure as in the previous 2 groups was performed, but no radiation treatment was admin.; and Group D, 3 untreated dogs who served as normal controls. The animals in Groups A, B and C were sacrificed at intervals ranging from 30 min.-6 mo. after irradiation or surgery. In the alloxan-pretreated animals of Group B, irradiation-induced extensive ultrastructural alterations of Group A were not observed (aside from occasional minor exceptions); however, a marked reduction in pancreatic lipase, amylase and leucine aminopeptidase occurred similar to those observed in Group A (and described at the beginning of the abstract). In animals of Group C, an equivalent decrease of these enzyme activities was observed in spite of little or no alteration of the ultrastructure. The enzyme decline after admin. of alloxan alone is in keeping with its known reducing effect on protein synthetic activity and the action of this drug on amino groups and -SH radicals. The protection of the fine structure of the exocrine pancreas by alloxan may possibly be explained by the hypothesis that its interaction with amino acids modifies the structure of proteins, particularly those with free amino groups of -SH radicals. No islet changes due to alloxan admin. were observed. Blood sugar values and glucose tolerance curves remained normal in all animals.

10537 SELECTIVE VISCERAL CANINE ANGIOGRAPH FOR PANCREATIC VISUALIZATION. USE O PHARMACODYNAMIC AGENTS. (E.) Lewicki, A. M. (Stanford U. Sch. Med., Palo Alto, Calif.), E. Kupic and S. Kohatsu. Invest. Radiol. 2(2): 119-122, 1967.

Selective and subselective visceral arteriogra (celiac and superior mesenteric arteries) were performed on mongrel dogs (9) after the use of histamine (0.275-0.55 mg), papaverine (15-65 m tolazoline (50 mg), bradykinin (5-100 µg) and trypsin (25-180 mg). Tolazoline produced only minimal vasodilatory changes; the degree of vasodilatation observed after admin. of papave and trypsin was moderate, whereas the most significant changes occurred after use of histamine and bradykinin, the latter being the most effective. The changes observed consiste of a noticeable increase in width of the large vascular branches into which the inj. was made and opacification of a greater number of fine branch vessels at the periphery. All agents produced an enhancement in visualization of th venous phase, the degree of which paralleled t initial arterial vasodilatory effect. A more pronounced degree of opacification of visceral walls and splenic parenchyma was noted in the late phases of the modified angiogram when it was compared to the control study. However, no case could a parenchymal phase be identifie in either the control or the modified angiogra

10538 EVALUATION OF TESTS OF PANCREATIC FUNCTION IN CHRONIC PANCREATIC DISEA (E.) Chey, W. Y. (Temple U. Health Sci. Ctr. Philadelphia, Pa.), H. Shay, O. F. Nielsen an S. H. Lorber. J.A.M.A. 201(6):347-350, 1967.

Pancreatic function tests were studied in 81 patients (67 males, 14 females; 26-83 yr. old with chronic pancreatic disease (65 with chro pancreatitis, 16 with cancer of the pancreas) The tests included pancreozymin-secretin stimulation, fasting serum enzyme levels, sta tolerance, triolein-^{131}I test, and chemical determination of fecal fat. Abnormal results were obtained by analysis of duodenal content in 70 (86%), including 56 with chronic pancreatitis and 14 with cancer of the pancreas; abnormal results were also obtained by serum enzyme (amylase) response in 13 (19%) and by elevated fasting serum enzyme levels in 9%. abnormal serum response was observed more frequently in patients with a mild degree of pancreatic exocrine insufficiency. Abnormal results were obtained by the glucose toleranc test in 56 (69%), the starch tolerance test i 20 (25%) and the triolein-^{131}I test in 29 (36 These abnormal results were observed more frequently in patients with advanced pancreat exocrine insufficiency. Analysis of duodenal contents was the most sensitive and reliable in the diagnosis of chronic pancreatic diseas

9 PANCREATIC ASCITES. (E.) Cameron, J. L. (Johns Hopkins U. Sch. Med., imore, Md.), R. P. Anderson and G. D. Zuidema. . Gynec. Obstet. 125(2):328-332, 1967.

-yr.-old Negro female is reported with normal r function and histologic findings who had tes resulting from chronic pancreatitis; a ew of the literature showed 13 similar cases ascites secondary to benign chronic pan- tic disease, and most of whom had an asso- ed pseudocyst. The patient of this study a history of heavy alcoholic intake during past 12 yr. which amounted to 1 quart of key, 1 quart of wine and 6 bottles of beer wk., most of which was consumed on the wk.-end. his patient, a sphincterotomy was performed, the distal portion of the pancreas, pseudo- and spleen were resected; a Roux-en-Y nal limb was anastomosed to the distal por- of the pancreas. The postoperative course uneventful, the ascites did not recur and patient has remained well. It is suggested pancreatic ascites is a definite clinical ty, currently overlooked because of the ical setting in which it usually occurs: a ent with a heavy ethanol intake. The erentiation of this disorder from hepatic hotic ascites is made on the basis of a ascitic fluid amylase and protein content; protein content of ascitic fluid in hepatic hosis usually ranges between 0.5-1.5 g/100 and the range in patients with pancreatic tes is 2.9-5.7 g/100 ml. In this disorder, ical pancreatic drainage appears to be tive.

0 FURTHER OBSERVATIONS ON TRYPSINOGEN DEFICIENCY DISEASE: REPORT OF A SECOND . (E.) Townes, P. L. (U. Rochester Sch. Dent., N. Y.), M. F. Bryson and G. Miller. ediat. 71(2):220-224, 1967.

irth the infant weighed 2240 g and on dis- ge at 25 days of age he weighed 2211 g; at ime during the 25 days did the body wt. equal xceed the birth wt. On first admission after h, the infant presented with severe hypo- einemia, edema, anemia and growth failure, subsequently developed nutritional hypo- motrichia. The patient responded well to a ein hydrolysate diet supplemented with Fe, anemia and edema persisted for a short time then was corrected within 2 wk. of therapy; wt. doubled within 6-8 wk. of therapy. ound anemia which developed was unresponsive e therapy and persisted in the presence of uate Fe stores; it was rapidly corrected r treatment with Nutramigen (a nutritional ula) and thus was thought to be due to pro- deficiency. There was no trypsin activity spirates of duodenal juice before and after sin activation. The finding of a second unrelated to the first in a single community ests that trypsinogen deficiency disease is ably not a rare disease; 2 cases in 17,588 births (which occurred in Rochester, N.Y. during the 30-mo. period in which the 2 cases of trypsinogen deficiency disease occurred) suggest an incidence of the order of approx. 1 in 10,000. Since this disorder is treatable, it is important to consider it in the differential diagnosis of any infant with hypoproteinemia, edema and failure to thrive.

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l pancreatic allografts were performed in 82
by variations of arterial and venous anasto-
c technic in the presence or absence of
reatic duct ligation as an attempt to eluci-
the pathogenesis of necrotizing pancreatitis.
tal of 52 dogs received a pancreas transplant
g a venous end-to-side technic with a smaller
er receiving transplants with the 2 possible
eties of arterial anastomosis and with or
out duct ligation. Of these 52, 2 trans-
ted glands developed pancreatitis within 24
one was an end-to-end and the other an
to-side anastomosis of the artery. Both had
ted ducts. The remaining 30 dogs were
pients in which the venous anastomoses were
end-to-end. All had ligation of the duct.
his group, there were 26 instances of necrotiz-
pancreatitis. The amylase values of the dogs
h survived more than 18 hr. were higher than
e in the end-to-side anastomosis group. The
splanted glands with pancreatitis showed a
ound vasculitis with perivascular edema,
us wall necrosis, intravascular thrombosis
extravasation of blood into pancreatic
rstitium. Two contributing factors to this
incidence of pancreatitis discussed were
degree of physiologic obstruction which exists
n end-to-end venous anastomosis and the
ificant anatomic arrangement of the left
c vein.

4 SOME PROBLEMS OF EARLY RECOGNITION AND
EVOLUTION OF ACUTE PANCREATITIS. (Rus.)
ova, A. I. (Kalinin Med. Inst., USSR). *Sovet.*
29(12):87-91, 1966.

00 patients (186 females, 14 males; age 21-
than 80 yr.) with acute pancreatitis (de-
ctive form, 6%, acute edema of gland, 94%)
amylase content in saliva (taken on empty
ach or 7 hr. after eating) was increased up
6,384 U. This was shown by modification of
gemuth's method (0.2 ml saliva dissolved in
physiologic soln., then 0.2 ml were diluted
1 ml physiologic soln., and repeated 15
s. A high amylase content in urine (Wohlge-
test) was found in 50% at hospitalization,
9.5% on day 2, and in 43.5% on day 3. De-
se in pain syndrome was accompanied by a
ed decrease in amylase content in saliva,
not in urine. In 37 healthy persons amylase
ent in saliva was 32-64 U. In 100 patients
acute diseases of the abdominal organs,
ase content in saliva and urine was normal
fluctuated between 32-128 U in 99, while in
reached 256 U. A painful spot, at 1.5-2 cm
w xiphoid process in the epigastric region,
acteristic for acute lesion of pancreas, was
d in all 200 patients in an early stage of disease. In passive straighening of the lumbar section of the spine, 73 patients indicated strong pain in epigastric region above the umbilicus. In distinctive forms it occurred early and was persistent despite use of anesthetics. Diet had effects on the course of acute pancreatitis. Elimination of products with high stimulatory activity (white bread, honey, macaroni, meat, and others) assures normal course of the process and prevents early recurrence of the disease.

10565 STUDIES OF EXPERIMENTAL ALCOHOLIC PANCREATITIS IN THE DOG. (E.) Cueto, J. (West Virginia U. Sch. Med., Morgantown), N. Tajen and B. Zimmermann. *Surgery* 62(1):159-166, 1967.

Adult mongrel dogs (35) were divided into 5 groups as follows: Group 1 (20 dogs), in which a Stamm gastrostomy was performed; Group 2, a Roux-en-Y gastrojejunostomy was done; in addition, a gastrojejunostomy was added after a partial pyloroectomy and an end-to-side jejunojejunostomy 10 cm distal to the gastrojejunostomy, and also a Stam gastrostomy; Groups 3 and 4 (5 dogs in each group), a Roux-en-Y gastrojejunostomy and a catheter duodenostomy; and Group 5 (5 dogs), Stam gastrostomy, duodenostomy and cannulation of the main pancreatic duct. Ethanol was admin. 5 times/wk. in a dose of 6 g/kg in animals in Groups 1 and 5, and 1-2 times/wk. in Groups 2, 3 and 4; 95% ethanol was diluted 1:2 using a 0.25 M soln. of $NaHCO_3$ and 500 mg of choline in Groups 1, 2, 4 and 5 (pH approx. 8). In Group 3, 15 ml of 0.1 N HCl (pH approx. 3) was substituted for bicarbonate). Animals were fed a high-protein, high-choline diet. In 5 additional dogs, daily i.v. infusions of equivalent amounts of ethanol diluted 1:3 with sterile 5% dextrose in water were admin. for periods up to 2 wk.; infusion time av. 90 min. Animals receiving ethanol by gastrostomy developed increased blood levels of amylase and lipase, hyperlipemia, hemolysis, inhibition of lipoprotein lipase and histologic changes of chronic interstitial pancreatitis. Peak conc. of serum ethanol occurred during the second hr. after admin. of ethanol; the route of admin. did not seem to alter the rate of absorption. At the end of 24 hr., no ethanol was detected in the serum. Animals in Groups 2, 3 and 4 tolerated ethanol poorly and failed to maintain their normal wt., as opposed to animals in Groups 1 and 5. In the former animals, causes of death were perforated anastomotic ulcers, pneumonia and cardiac failure. These experiments show clearly that ethanol, when given in large doses into the stomach, does produce chronic pancreatitis without liver damage in dogs fed high-protein, high-choline diets. A local neurohumoral mechanism is suggested, since large amounts of acid in the duodenum and/or jejunum are required. Obstruction at the ampullar level did not appear to play an important role.

10566 PEPTIC ULCERATION AND GASTROINTESTINAL BLEEDING IN PANCREATITIS. (E.) Marks, I. N. (Groote Schuur Hosp., Cape Town, South Africa), S. Bank, J. H. Louw and J. Farman. Gut 8(3):253-259, 1967.

The association between peptic ulceration and pancreatitis was examined in a series of 529 patients with pancreatitis, 99 of whom had pancreatic disease unassociated with pain. In 336 patients, alcohol was the major etiological factor, and biliary disease in 80. Pancreatitis due to penetrating peptic ulcers was responsible for 9 cases, and other miscellaneous causes for 59; the etiology was unknown in the remaining 45 patients. Calcification of the pancreas was present in 85 patients. Radiological evidence of peptic ulceration or carcinoma and gastrointestinal hemorrhage was found in 77 (18%) of 430 patients with painful pancreatitis. In fact, however, the incidence of peptic ulceration was only 3.5%. Reasons are suggested for the discrepancy between the incidence of peptic ulceration in this and other reported series. Duodenal cap deformities due to pancreatitis but attributed to peptic ulceration were regarded as a possible cause of this discrepancy, as was the inclusion of a relatively large proportion of patients with clinically unimpressive localized pancreatitis secondary to posterior penetration of a peptic ulcer in any given series. Reference is made to occasional presentation of pancreatitis as an ulcer-type dyspepsia. It is emphasized that the occasional but massive hemorrhage may occur in patients after drainage procedures on a pancreatic cyst, and that a variety of causes are responsible for gastrointestinal hemorrhage in patients during an attack of pancreatitis. The latter include acute gastric erosions or mucosal congestion secondary to contiguous pancreatitis, splenic vein obstruction due to pancreatic compression, the Mallory-Weiss syndrome, alcoholic gastritis and possibly, varices due to cirrhosis. Major causes of hemorrhage in patients who were not suffering an attack of pancreatitis at the time included carcinoma, varices due to cirrhosis and chronic peptic ulceration.

10567 THE ROLE OF GLUCAGON HYPERSECRETION IN THE RELATIONSHIP OF PANCREATITIS AND HYPERPARATHYROIDISM. (E.) Paloyan, E. (U. Chicago, Ill.), D. Paloyan and P. V. Harper. Surgery 62(1): 167-173, 1967.

Ten male mongrel dogs received a constant i.v. infusion of 0.1 kg/kg/hr. of crystalline glucagon in 100 ml of physiologic saline over an 8-hr. period; controls received saline. Following the 8 hr. of glucagon infusion, there was a 2.1 ± 0.2 mg% mean fall in serum Ca, but infusion of saline produced a mean fall of 0.3 ± 0.1 mg%; this difference was highly significant. In a second experiment, nonlethal acute pancreatitis was induced in 6 adult mongrel dogs, while controls underwent laparotomy and manipulation of the duodenum. There was a progressive rise in serum
glucagon to very high levels, attaining a max.
that ranged between 48-120/ng/ml, and in contr
serum glucagon levels fluctuated slightly abov
baseline levels (0-6 ng/ml); serum Ca fell
sharply in both groups, but at 24 and 48 hr.
the experimental dogs attained significantly
lower values than controls. In a third exper
serum immunoassayable glucagon was determined
12 patients with acute pancreatitis and 6 pat
with chronic pancreatitis; a control group of
patients included a variety of intra-abdomina
conditions. There was a marked increase in s
glucagon in most cases of acute and chronic
pancreatitis, in contrast to patients with ot
abdominal complaints. In a fourth experiment
serum Ca and P were determined in 23 patients
with acute pancreatitis, and the same determi
tions were done during the first 4 days of
hospitalization in 15 patients with perforate
ulcers who served as controls. A serum P of
2.5 mg% or less was noted in 18 of 23 patient
with acute pancreatitis, and, in contrast, no
of the patients with perforated ulcers had a
serum P below 2.5 mg%. In the absence of exo
nous Ca admin., there was a temporary rebound
hypercalcemia greater than 10.5 mg% in 8 of 1
of the patients recovering from acute pancrea
Finally, a group of New Zealand white male
rabbits received a daily inj. of 5 mg of crys
line glucagon suspended in a mixture of beesw
and mineral oil, and 8 wk. later their extern
parathyroid glands were excised and examined:
9 of 11 surviving rabbits that received gluca
developed parathyroid hyperplasia, characteri
by a marked increase in cellularity; conspicu
α-cell degranulation was observed in the isle
of Langerhans in all rabbits receiving glucag
It is concluded that there may be an antagoni
between parathyroid hormone and glucagon with
respect to serum Ca, at least in certain situ
tions, and much of the clinical and experimen
evidence suggests that in the syndrome of pan
creatitis associated with hyperparathyroidism
pathologic changes occur first in the pancrea
with subsequent development of parathyroid hy
function.

10568 STUDIES ON THE EXOCRINE PANCREAS.
ULTRASTRUCTURAL INVESTIGATION OF RE
VIRUS PANCREATITIS. (E.) Papadimitriou, J.
(U. Western Australia, Perth) and M. N.-I. Wa
Amer. J. Path. 51(3):387-403, 1967.

A 10^{-2} dilution of hepatoencephalomyelitis vi
the prototype strain of reovirus Type 3 was i
i.p. into neonatal Prince Henry mice, which w
sacrificed, at the rate of 3/day, from the fi
to the ninth days after inoculation; biopsies
the pancreas of these mice were studied by li
and electron microscopy. Pancreases from 9
neonatal mice between the ages of 1 and 9 day
were used as controls. The glandular tissue
the first 3 days after inoculation did not re
any deviations from normal architecture when
compared with specimens from control mice. B
the fourth day, in a few small venules, monoc

e seen containing intracytoplasmic aggregates
virus particles. The lumens of both acini and
tules were dilated, in comparison with normal
trols. From the fifth day, areas of focal
oplasmic degradation or "cytosegresomes" were
dent in the acinocytic cytoplasm, becoming
h more prevalent by the eighth and ninth days
infection; such areas were often large,
suring 5-6 μ in diameter, and were usually
tained within a limiting membrane. In a few
osegresomes, and always within an included
se body aggregates of small, dense structures
suring 250-300 Å in diameter were seen; these
embled nucleoids of Reovirus particles in size
shape. The main pancreatic duct was dilated
there was viral multiplication in the cyto-
sm of cells lining the terminal end of the
creatic duct near its junction with the common
e duct; only those cells lining the main duc-
lumen showed viral replication, and there was
ll no evidence of viral invasion of the cells
ing the smaller lobular ducts by the ninth
of infection, although their lumens were
ated and the lining cells flattened. The
nar lumen remained dilated and often contained
se bodies and myelin figures; many of the
ing cells, in addition to other changes men-
ned, exhibited blebbing of the luminal sur-
e. It is postulated that, although reovirus
invade acinocytes, much of the damage of
virus pancreatitis is the direct result of
truction.

69 IRON ABSORPTION IN CHRONIC PANCREATITIS.
(E.) Balcerzak, S. P. (VA Hosp.,
tsburgh, Pa.), W. W. Peternel and E. W. Heinle.
troenterology 53(2):257-264, 1967.

dies of Fe absorption, Fe stores, Fe kinetics,
er morphology and function, and pancreatic
ction were evaluated in 11 men with chronic
creatitis, all of whom consumed excess alcohol.
secretin test was abnormal in 10, pancreatic
cifications were found in 8, 9 had evidence of
betes mellitus and 7 had steatorrhea. Serum
lase was elevated in 7 of 10 patients, and
um lipase was increased in 2. Some evidence
hepatic abnormality was found in most, if not
, of the 11 patients, but at the time of Fe
orption measurement, significant abnormalities
e detected in only 5. Fe absorption was normal
9 and increased in 2 patients; Fe stores were
rmal or decreased in all except 1 whose increase
slight. The degree of pancreatic insuffi-
ency did not correlate with the quantity of Fe
orbed or in stores. The 2 patients with in-
eased Fe absorption had causes other than
creatic disease to account for the increase;
h were Fe-deficient and had liver disease.
e slight increase in Fe stores seen in 1 patient
have been the result of his mild anemia.
ese findings suggest that increased Fe absorp-
n or Fe stores are unusual in chronic pan-
eatitis, and, when they occur, may result from
other cause. These results indicate that the
creas does not play a significant role in the
trol of Fe absorption.

10570 DUODENAL REFLUX AND THE ETIOLOGY OF PANCREATITIS. (E.) Johnson, R. H. (NIH, Bethesda, Md.) and J. Doppman. *Surgery* 62(3):462-467, 1967.

Three experiments were done on (13) rhesus monkeys (*Macaca mulatta*) of both sexes to investigate the relationship between duodenal reflux and pancreatitis. In the first experiment, 8 monkeys were equipped with a closed duodenal loop by ligation of the intestine at the pylorus and ligament of Treitz. Secretin (20 clinical U) and a mixture of 75 Ivy dog U of cholecystokinin and 300 Crick, Harper and Raper U of pancreozymin was admin. i.v. to each animal 30 and 15 min., resp., before distention of the duodenal loop with Conray 60 to a pressure of 40 cm (of Conray). In 7 of 8 animals, transampullary reflux of contrast material was noted; the time of reflux varied between 1-120 min. after admin. of cholecystokinin-pancreozymin, the av. time being approx. 40 min. All refluxing animals had definite gross and microscopic evidence of varying degrees of pancreatitis, ranging from scattered petechiae and fat necrosis to massive confluent hemorrhage. Serum amylase determinations were done in 4 of 7 refluxing monkeys; in 3 the values were markedly elevated, being 3,100, 2,400 and 8,100 Van Loon U. The monkey that did not reflux was left distended for 2.5 hr.; pancreatitis did not develop, and amylase values did not rise. In the second experiment, 3 monkeys were prepared with closed duodenal loops identical to those of the first experiment; these loops were also distended with Conray 60 to a pressure of 40 cm, which was maintained for 3 hr. No hormones were admin. No gross or histological evidence of pancreatitis was found, and serum amylase values were normal in all instances. In the third experiment, 2 animals were given doses of secretin and cholecystokinin-pancreozymin as in Experiment 1, but no ther manipulations were done; no adverse effects occurred, serum amylase values remained normal and the pancreas was normal. These findings support the hypothesis that duodenal reflux is important in the etiology of human pancreatitis, and suggest a pathophysiological explanation for its occurrence.

10571 ACUTE PANCREATITIS; PATHOGENESIS AND THERAPEUTIC TRIALS. (Kor.) Hong, S. S. (Yonsei Univ. Coll. Med., Seoul, Korea). *Korean J. Intern. Med.* 10(3):149-170, 1967.

Evaluations of the role of alcohol, bile, or other agents on the pathogenesis of acute pancreatitis were made in rabbits and the efficacy of therapeutic agents including Trasylol in the treatment of acute pancreatitis in rabbits and man was studied. Intraductal instillation of bile, ethanol, cholates and HCl resulted in severe parenchymal and fat necrosis of the pancreas. The instillation of trypsin, enterokinase or pancreatic microsome fraction also caused moderately severe parenchymal and fat necrosis. Methanol, myocardial microsomes, saline, or ligation of the pancreatic duct alone caused only edematous pancreatitis. Although the instillation of trypsin brought additional severe hemorrhagic changes, these observations indicate that acute pancreatic necrosis is elicited by the inherent toxicity to the pancreatic acini of the specific agents other than activation of proteolytic enzymes. The severe pancreatitis might be caused by the release of intracellular enzymes or factors resulting from an admixture of pancreatic juice and bile or alcohol. The max. rise in both serum amylase and lipase occurred on the first postoperative day; serum lipase returned to preoperative levels on the third day, and serum amylase on the fourth day. The levels of both serum enzymes were paralleled with the severity of pancreatitis. The survival rate of animals with bile-induced necrotizing pancreatitis was significantly increased in a decreasing order in groups treated with Trasylol, hexamethonium and acetazolamide. Atropine and propylthiouracil were also effective but cortisone did not change the mortality rate. In the animals treated with drugs the development of parenchymal necrosis appeared to be delayed. Particularly, Trasylol-treated animals had less hemorrhagic or fatty necrosis. Clinically, Trasylol brought a faster recovery in 10 patients with acute pancreatitis and no mortality was observed in this group. Trasylol tended to decrease the frequent use of opiates and in some patients caused a dramatic relief of pain.

10572 PANCREATITIS. (E.) White, T. T. London, Arnold (Publishers) Ltd., 1966, 214pp., $11.20.

10573 ACUTE PANCREATITIS RELATED TO GROSSLY MINUTE STONES IN A RADIOGRAPHICALLY NORMAL GALLBLADDER. (E.) Block, M. A. (Henry Ford Hosp., Detroit, Mich.) and R. J. Priest. Amer. J. Dig. Dis. 12(9):934-938, 1967.

10574 IMMUNOLOGIC IMPLICATIONS IN CHRONIC PANCREATITIS. (Sp.) Bartolomew, L. G. (U. Minnesota, Rochester), J. C. Cain and J. S. Aldrete. Prensa Med. Argent. 53(1-8):130-138, 1966.

10575 CLINICAL SIGNS OF CHRONIC PANCREATITIS. (Fr.) Gérard, A. Lille Med. 12(6): 715-518, 1967.

10576 INDICATIONS TO HORMONAL TREATMENT OF ACUTE PANCREATITIS AND HAZARDS OF ITS EMPLOYMENT. (Rus.) Kochnev, O. C. (Kazan Med. Inst., USSR). Klin. Med. (Moskva) 45(5):28-34, 1967.

10577 PROBLEMS IN THE DIAGNOSIS OF RECURREN PANCREATITIS. (E.) Jordan, G. L., J (Baylor Univ. Coll. Med., Houston, Tex.). Southern Med. J. 60(7):726-729, 1967.

10578 PANCREATITIS FOLLOWING PARATHYROID SURGERY. (E.) Johnson, D. C. (Roy. North Shore Hosp., Sydney, Australia) and J. N Stiel. Med. J. Aust. 2(1):25-27, 1967.

10579 ZIEVE'S SYNDROME ASSOCIATED WITH CALCIFYING PANCREATITIS. ROLE OF TH PANCREAS AND LYSOLECITHINS IN ANEMIA. (Fr.) Gadrat, J. (Purpan Hosp., Toulouse, France), L Douste-Blazy, A. Ribet, J. P. Pascal and J. Frexinos. Presse Med. 75(16):789-792, 1967.

10580 DIAGNOSIS OF POSTOPERATIVE PANCREATI AFTER GASTRECTOMY. (Cz.) Pstružina J. (Fac. Med., Prague), V. Šistek and R. Ronsk Cesk. Gastroent. Vyz. 21(2):118-121, 1967.

10581 CLINICAL OBSERVATIONS ON CASES OF ACUTE PANCREATITIS TREATED WITH TRASYLOL. (Pol.) Pinski, M. (3rd Surg. Clin. Stettin, Poland). Przegl. Lek. 23(3):329-332, 1967.

10582 THE EFFECT OF A PROTEIN-RICH DIET ON THE TRYPSIN ACTIVITY IN THE BLOOD SE OF PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Shaternikov, V. A. (Inst. Nutr., Moscow), I. I Kniazev and S. A. Tuzhilin. Vop. Pitan. 26(4) 54-57, 1967.

10583 CHRONIC RELAPSING PANCREATITIS. (E.) Sharma, T. C. (Washington Hosp. Ctr., Washington, D. C.), A. A. Dowli and E. A. Goul Amer. J. Gastroent. 48(1):38-48, 1967.

10584 CLINICAL PICTURE, IDENTIFICATION AND TREATMENT OF CHRONIC PANCREATITIS. (Rus.) Gubergrits, A. Ia. (Gor'ko Donets Med. Inst., USSR) and E. N. Nechaev. Sovet. Med. 30(7):82-87, 1967.

10585 HYPOGLYCEMIA AFTER LEFT SPLANCHNICECT FOR PANCREATITIS. (Fr.) Lataste, J. (Hotel-Dieu, Paris) and J. C. Docquier. Presse Med. 75(22):1101-1104, 1967.

10586 SPLANCHNICECTOMY IN THE TREATMENT OF CHRONIC PANCREATITIS. (It.) Prior, C. (U. Genoa, Italy), P. P. Paoletti and S. Troncone. Minerva Chir. 22(14):809-814, 1967.

87 EFFECT OF BILE AND BILE ACIDS ON THE
ACTIVITY OF CHOLINESTERASE. (Rus.)
tovit, V. A. (Kiev Infect. Dis. Sci. Res.
t., USSR) and E. P. Tkachuk. Vrach. Delo
:116-118, 1967.

dy with albino mice (20 g wt.; total 300),
s (230-300 g wt.; total 27) and rabbits (2100-
0 g wt.; total 43) showed that bile and bile
ds during prolonged i.v. and p.o. admin. de-
ased cholinesterase activity in the blood as
pared to controls. In mice inj. i.v. with bile
1 ml (0.5 mg)/day x 10] serum cholinesterase
ivity decreased by 14.2% and hepatic and cardiac
ivity of the enzyme increased by 12.22 and
32%, resp. Cholic acid (160 mg/day x 14, p.o.)
sed in rats a decrease of blood cholinesterase
ivity by 51.77%, and an increase of that in
er and heart by 26.35 and 21.62%, resp. In
bits serum cholinesterase activity decreased
er 6 days of i.v. treatment [dose 0.5 ml/kg/day
mg/kg/day) for 12 days; bile was given also
18 days] with bile by 20.82%, with deoxycholic
d by 67.52%, with cholic acid by 36.54%, and
h lithocholic acid by 69.66%. After 12 days of
atment cholinesterase activity in serum con-
ued to decrease only after bile, here it showed
e increase but did not reach its initial level.
er 12 days of treatment the cholinesterase
ivity in liver and heart tissue increased with
e by 48.66 and 50.77%, resp.; with deoxycholic
d by 68.98 and 81.44%, resp.; with cholic acid
80.14 and 135.49%, resp.; with lithocholic acid
56.5% and uncertain increase, resp. Therefore,
is assumed that the decrease of serum cholin-
erase activity in the patients with obstructive
ndice, accompanied by prolonged cholemia, de-
ds on lesions of the hepatic parenchyma, which
urred as a result of the toxic action of bile
bile acids.

88 COCHLEAR FUNCTION IN PATIENTS WITH
DISEASES OF THE LIVER. (Rus.)
'shmein, L. I. (Avitsenny Med. Inst., Tadzhik-
an, USSR). Vestn. Otorinolaring. 29(4):50-55,
7.

aring acuity (tonal and speech audiometry) was
died in 110 patients (64 males, 46 females;
mostly up to 40 yr.) with acute infectious
atitis, and in 51 with chronic hepatitis and
with liver cirrhosis (103 of 157 are males over
yr. old). In the acute infectious hepatitis
ses, decreased hearing at frequencies of 4096
8192 hertz was found in 31 (with moderate-
vere form), 19 of these were bilateral and 12
ilateral. Following treatment hearing was
rmal in 19 and unchanged in 12. Complete deaf-
ss following acute infectious hepatitis oc-
rred in one 5-yr.-old. In decreased hearing was
und in 91 (58%) of the patients with chronic
patitis and cirrhosis. Otoscopy showed depressed
mpanic membrane in 21 (13%) and chronic
suppurative mesotympanitis in 4. Four types of audiograms were determined in the group of chronic hepatitis and cirrhosis patients. Type 1 (significant decrease of perception in the region of low frequency and slight in the region of high frequency) was found in 16 (10%) patients with moderately drawn-in tympanic membrane; Type 2 (marked decrease of hearing at frequency 4096 and 8192 hertz with slight decrease at 2048 hertz and almost normal level at other frequencies) in 34 (21%) patients. Type 3 (hearing decrease at all frequencies, greater at high) was found in 38 (36%) with liver cirrhosis; Type 4 (decreased hearing at all frequencies in 1 ear and decreased hearing only at frequency 4096 hertz in the other ear) occurred relatively seldom (4%) in patients with liver cirrhosis. Therefore, exacerbation in the course of this process in the liver is accompanied, as a rule, also with exacerbation of cochlear function. Two case histories are given in detail.

10589 CHANGES IN THE PROTHROMBIN COMPLEX COMPONENTS (PROTHROMBIN,PROCONVERTIN, PROACCELERIN) IN CHRONIC HEPATITIS AND CIRRHOSIS. (Rum.) Stanescu, M. (Cantacuzino Hosp., Bucharest) and F. Stroescu. Med. Intern. (Bucur.) 19(4): 417-423, 1967.

In 12 patients with chronic hepatitis Quick time was 14-20 sec., prothrombin time (Factor II) was 35-70 sec., proaccelerin time (Factor V) was 20-30 sec. and proconvertin time (Factor VII) + Factor II varied between 51 and more than 90 sec. Determinations of the same components in 33 cases of cirrhosis revealed that Quick time was 15-23 sec., Factor II was 35-85 sec., Factor V was 20-40 sec. and Factor II + Factor VII varied from 60 to more than 120 sec. In 20 controls, Quick time was 13-16 sec., Factor II was 30-50 sec., Factor V was 18-30 sec., and Factor II + Factor VII varied between 40 and 51 sec. The results indicate that components of the prothrombin complex are consistently altered in both chronic hepatitis and cirrhosis, with the latter showing more significant alterations. Prothrombin and proconvertin underwent the most drastic modifications which may be due to the fact that both of these factors are synthesized mostly, if not exclusively, in the liver.

10590 THIAMINE AND ITS PHOSPHORYLATED ESTERS IN HEPATIC DISEASE (NOTE III). (Rum.) Manta, I. (Sch. Chem. Biol., Cluj,,Rumania), V. Gorun and N. Hîncu. Fiziol. Norm. Pat. 12(6): 531-534, 1966.

Thiamine and its esters (thiaminemonophosphate, thiaminepyrophosphate, and thiaminetriphosphate) were lower in the serum of 53 patients with various pathological liver conditions than in controls (thiamine - 5.2, thiaminemonophosphate - 6.8, thiaminepyrophosphate - 8.5, thiaminetriphosphate - 6.1 mg % serum). The smaller variations were noted in cases of cirrhosis (6 of 53; thiamine - 3.10, thiaminemonophosphate - 4.46, thiaminepyrophosphate - 3.28, and thiaminetriphosphate - 1.7 mg% serum) and in active chronic hepatitis (23 of 53; thiamine - 3.05, thiaminemonophosphate - 2.97, thiaminepyrophosphate - 2.54, and thiaminetriphosphate - 2.40 mg% serum). The lower values were obtained in cases of hepatitis with associated heart disease (thiamine - 0.02, thiaminemonophosphate - 0.09, thiaminepyrophosphate - 0.06, thiaminetriphosphate - 0.30 mg% serum. In 6 cases of toxic hepatitis (caused by intoxication with benzene, or polyvinyl chloride, or Hg) the values return to normal upon improvement of the patient's condition. The study of the relationship between the phosphorylated thiamine esters in patients with cirrhosis and active chronic hepatitis reveals increase of thiaminemonophosphate as compared to significant decrease of thiaminepyrophosphate, indicating that although thiamine is normal, the transformation of thiamine into carboxylase is not stoichiometric. In liver hepatitis associated with heart disease the conc. of thiamine and its esters, while low, are not greatly different, while in toxic hepatitis the values vary according to the case and are not characteristic. Pyruvic acid was higher in the serum of patients studied than in controls, the greater values being obtained in cases of hepatitis and associated heart disease (where cocarboxylase had its lower values) while liver cirrhosis patients had the lowest values. The values of ATP were proportional to pyruvic acid and inversely proportional to cocarboxylase.

10591 METHOD FOR STUDY OF EXTERNAL SECRETION OF LIVER IN DOGS WITH INTACT GALLBLADDER AND HEPATO-INTESTINAL CIRCULATION. (Rus.)

Nesterin, M. F. (Inst. Nutr., Acad. Med. Sci., Moscow) and R. V. Narodetskaia. Biull. Eksp. Biol. Med. 63(5):121-122, 1967.

A method is described that preserves the entire cholagogic system with exclusion of a duct from 1 of the hepatic lobes in which a canula is induced. The duct of the left liver lobe was ligated, at the site of its inflow into the common bile duct, by a thread and the latter was placed under the free part of the duct between the hepatic lobe and established ligature; then the duct chosen for cannulation was partially incised, and the cannula induced into the first sleeve tubule and was fastened in the duct by the supplied thread; with another ligature the tubule was fixed to the duct from the other side of the sleeve, the tubule was fastened on 2 sides of the following sleeve to the external surfacr of duodenum in the region of inflow of the common bile duct. Some supply of the tubule was left in the abdominal cavity while its remaining part was fixed to the internal surface of abdominal cavity in both sides of the sleeves; the tubule end (6-8 cm long) is left as an outlet in the wound. Several days after surgery in dogs the conc. of bile components, excreted on an empty stomach before food stimulation, was at lower levels. Combination of this method
with the method earlier reported enables deter
mination of conc. ability of gallbladder under
natural conditions, and total amount of bile e
creted by liver with a normally functioning ga
bladder. The disadvantage of this method is
partial loss of bile. Cannulation of the hepa
lobe was made on rats which enabled exclusion
total bile loss from the process of digestion.

10592 EXPERIMENTAL AUTOIMMUNE HEPATITIS.

Morettini, A. (U. Florence, Italy),
A. Corradi, F. Pacini, A. Ghetti and G. Berni.
Folia Allerg. (Roma) 13(6):407-421, 1966.

The possibility of inducing experimental autoi
mune hepatitis by various technics was studied
120 Sprague-Dawley rats (wt. 150-200 g). In
Experiment 1, rats were treated s.c. with auto
ogous whole liver extracts (0.5 ml) in Freund'
adjuvant (0.5 ml) once a wk. for 10 wk.; histo
examination in these animals revealed parvicel
infiltration of the portal spaces as well as d
generation and piecemeal necrosis of single or
groups of hepatocytes; controls treated with a
ogous whole liver extracts alone or with Freun
adjuvant alone showed no hepatic changes; hepa
alterations were prevented in rats treated wit
autologous liver extracts and Freund's adjuvan
with the admin. of hydrocortisone hemisuccinat
(2.5 mg/day s.c. for 10 wk.) or triethyleneimi
benzoquinone (2.5 µg i.p. twice a wk. for 10 w
In Experiment 2, rats were treated with homolo
microsome liver fractions (0.5 ml/wk.) and Fre
adjuvant (0.5 ml/wk.) for 10 wk. or with homol
ribosome liver fractions (0.5 ml/wk.) and Freu
adjuvant (0.5 ml/wk.) for 10 wk.; no significa
hepatic changes were observed at histological
examination in these animals. Nor were any ch
observed in rats treated with homologous micro
or ribosome liver fractions without Freund's a
juvant. In Experiment 3, rats subjected to
splenectomy after 5 wk. of treatment with auto
gous whole liver extracts (0.5 ml/wk. s.c.) an
Freund's adjuvant (0.5 ml/wk.) showed a worsen
of the hepatic alterations observed in Experim
1: distortion of hepatic lamina, perilobular a
focal necrosis, and marked lymphocyte infiltra
of portal spaces. No changes were observed in
animals subjected to splenectomy 10 days prior
the beginning of treatment.

10593 THE LIVER IN THYROTOXICOSIS. (E.)

Dooner, H. P. (U. Chile, Santiago),
J. Parada, C. Aliaga and C. Hoyl. Arch. Intern
Med. (Chicago) 120(1):25-32, 1967.

Biochemical and histological studies of the liv
of 15 patients with hyperthyroidism and 8 thyro
patients without thyrotoxicosis showed no paral
lelism between the liver function tests and the
biopsy findings in either group. However, the
liver function tests were deranged in the major
of the patients with thyrotoxicosis. The cepha
cholesterol flocculation reaction, the thymol t
bidity test, the serum alkaline phosphatase val

the plasma prothrombin time were all abnormal his group. The changes seen in the biopsy imens of this same group were: cytoplasmic ification in 8 cases, cytoplasmic vacuoliza- in 5 cases, absence of nuclei in 6 cases, ation in nuclear size in 5 cases and hyper- matism in 6. Other pathological changes were tosis in 3 cases, round cell infiltration in moderate increase of portal connective tis- in 5 and engorgement of the central vein in 4. omparison, in the second group of 8 patients flocculation tests were significantly changed nly 2 cases and histological changes were ificant in only 1 case. Cytoplasmatic clari- tion was notable in 2 cases. Steatosis was ent in 2 cases. The discrepancy in the fre- cy and severity of liver injury in this re- as compared with previous ones is explained he fact that the changes in the hepatic cell liver function are reversible.

4 GLUCOCORTICOIDS IN COMBINED TREATMENT OF CHRONIC LIVER DISEASE. (Rus.) dar, Z. A. Ter. Arkh. 39(3):13-20, 1967.

atment with glucocorticoids (prednisolone; -2215 mg in 2 wk. - several mo.) in 100 pa- nts (hepatitis, 25, cirrhosis, 75) had a favor- e effect on appetite and general conditions decreased both serum bilirubin level and trans- nase activity; however, they had no effect on functional condition of the liver. In Group 1 tive chronic hepatitis and liver cirrhosis), of patients with active chronic hepatitis, predni- one (40 mg/day gradually decreased, up to 12 duration) was effective in 10; of 46 patients h liver cirrhosis (postnecrotic, 26, portal, 20) exacerbation, prednisolone (20-25 mg/day dually decreasing, to 2 mo.) induced marked jective improvement while tests showed positive fts in 17, slight improvement in 15, and none 14. In Group 2 (cholestatic hepatitis and iary liver cirrhosis) all 7 patients with ndice were cured by prednisolone (30-40 mg dually decreasing, 2-3 wk.); good immediate ect occurred in 4, while none occurred in 3 of atients treated for cholestatic chronic hepa- is. Of 5 patients with biliary cirrhosis, dnisolone (20-25 mg gradually decreasing, dura- n to 2 mo.) caused improvement in 2 and slight 3. In Group 3 (liver cirrhosis with ascites) treatment with prednisolone (15-20 mg gradually reasing 2-3 wk. and combined with diuretics) ites disappeared in 6, decreased in 9, remained hanged in 7 and increased in 2 of 24 patients. le effects include gastric hemorrhage in 2 and olonged occurrence of blood in feces in 5. Data some symptoms following treatment with (over patients) or without (50 with chronic oatitis and liver cirrhosis) prednisolone e compared. In groups treated with predni- lone or in those not treated, a decrease in akness was found in 77 of 86 or 38 of 44, sp., of reduced appetite in 30 of 82 or 8 of , resp., of jaundice in 41 of 54 or 15 of 24, sp., of diuresis in 4 of 65 or 3 of 40, resp., of ascites in 22 of 30 or 3 of 8, resp., of leukopenia in 30 of 68 or 11 of 21, resp., and of thrombocytopenia in 15 of 40 or 4 of 18, resp. Alanine transaminase activity decreased in 42 of 53 following therapy with prednisolone. Two case histories are given in detail.

10595 BLOODLESS REMOVAL OF THE LIVER LOBES AND SEGMENTS WITH COMPRESSION OF HEPATODUODENAL LIGAMENT. (Rus.) Orlova, L. P. (5th Clin. Hosp., Minsk, USSR). Eksp. Khir. Anest. 12(2):39-42, 1967.

Surgery was performed on 16 random-bred dogs, age 2-5 yr. The abdominal cavity was opened, the hepatoduodenal ligament containing the portal vein, hepatic ducts and artery were isolated, and the latter pressed by vascular clamp for 15-60 min. One of the lobes or a necessary segment of the liver was freed and vessels of the removed part were isolated transparenchymatously; 1-1.5 cm below the segmentary vessels, the liver capsule was dissected, liver parenchyma was divided and vessels approached. Vascular clamps were placed on isolated vessels of the removed segment or hepatic lobe, marked parts of liver were resected, vessels were ligated by silk, and the hepatic wound remained bloodless during the entire period. After removal of the clamp the abdominal cavity was closed without drainage. Of 8 dogs operated on under conditions of hypothermia, 6 endured surgery, while of 8 dogs operated on under general ether-O_2 narcosis only 1 survived. Pathological-anatomical study of the dogs which died showed hepatic hemorrhages, polyemia, edema of hepatic canaliculus and lungs, and extensive hemorrhages in the gastrointestinal tract. Upon pressing of hepatoduodenal ligament 3 types of hepatic injuries were found (bile stasis, stasis in the portal vein, hepatic exsanguination). Around days 5-6 survivors were cheerful, ate well and shifts in liver function were absent; therefore, such a pressing dried the organ and enabled bloodless removal of parts of its parenchyma. Hypothermia increased time of liver ischemia. The best time for pressing ligature was 15 min.; and under conditions of hypothermia, up to 30 min.

10596 PORTAL VEIN THROMBOSES IN MALIGNANT HEPATOMA. (E.) Albacete, R. A. (VA Hosp., Washington, D. C.), M. J. Matthews and N. Saini. Ann. Intern. Med. 67(2):337-348, 1967.

A total of 25 cases (all males; 33-76 yr. old, av. age 58; 15 Negro, 8 Caucasian and 2 Oriental) of primary liver cell carcinoma were studied, and 100 cases each of cirrhosis and metastatic carcinoma to the liver were reviewed, to determine the prevalence of portal vein thromboses. The value of splenoportography as a useful adjunct in diagnosis of hepatoma was also assessed. The 25 cases of hepatoma were subdivided into clinical types; 10 were of Type 1, representing patients with known cirrhosis and a rapid downhill course; 9 were Type II, patients with unexplained hepatic insufficiency; 3 were of Type III, metastatic disease or other organ pathology; and 3 were Type IV, those with a picture of biliary obstruction. Abdominal pain was a significant complaint in only 7 (28%), and the outstanding feature was palpable enlargement of the liver; ascites was found in 16 (72%), and liver function tests showed mild hepatic dysfunction in 8 (32%) cases; the remaining 17 showed gradual elevation of bilirubin and SGOT. Scintillation scanning of the liver was performed in 5 cases and demonstrated space-occupying lesions in 4 cases. At autopsy, 18 of 25 hepatomas were associated with a coarsely nodular or postnecrotic variety of cirrhosis, 3 with nonspecific portal fibrosis, 2 with a mixed Laennec and postnecrotic pattern and 1 each with Laennec's cirrhosis and hemochromatosis with pigment cirrhosis. Liver wt. ranged from 900-7500 g, with an av. of 2780 g. In 8 cases (32%), there were grossly demonstrable thromboses of the extrahepatic portal venous system. Of these 8, 4 had massive tumors predominantly involving the right lobe, and the remaining 4 patients had multinodular tumors; in all of them, tumors were poorly differentiated, had metastasized to other organs and were associated with some degree of ascites. Of 100 cases of cirrhosis, most of whom were chronic alcoholics; bland portal vein thrombi were identified in 5. Of the 100 patients with carcinoma metastatic to the liver, portal vein thrombi were found in 5. Thus, portal vein thrombosis was found 6 times more frequently in patients with malignant hepatomas. The limitations of splenoportography in the diagnosis of portal vein thrombosis, as well as its value in diagnosis of hepatoma, are discussed; splenoportography is particularly contraindicated in patients with coagulation defects or in the presence of marked ascites. The diagnostic value of determining the presence of an extrahepatic portal vein thrombosis in hepatoma is stressed.

10597 SYSTOLIC LIVER MURMURS IN PRIMARY CARCINOMA OF THE LIVER. (E.) Zuidema, P. J. (Free U., Amsterdam, Netherlands) and C. Van Der Meer. Trop. Geogr. Med. 18(4):265-271, 1966.

Auscultation of a soft, systolic murmur over the liver of patients with primary liver carcinoma was studied in 20 patients in Indonesia with malignant hepatoma. Sounds were heard over the tumor in more than 50% of the cases, and were classified as hepatic friction rub, para-xiphoid-umbilical hum, and systolic murmur. Case histories given were of a 25-yr.-old farmer and a 25-yr.-old Japanese woman. Three cases were also given of patients from Amsterdam: a 59-yr.-old man, a 57-yr.-old man, and a 56-yr.-old woman. It is supposed that the murmur is associated with the pathological vascularization of the tumor, and the sound is considered to be a diagnostic sign.

10598 DIFFERENCE IN HEPATIC METABOLISM OF
LONG- AND MEDIUM-CHAIN FATTY ACIDS:
THE ROLE OF FATTY ACID CHAIN LENGTH IN THE PRO
DUCTION OF THE ALCOHOLIC FATTY LIVER. (E.)
Lieber, C. S. (Bellevue Hosp., New York, N. Y.
A. Lefèvre, N. Spritz, L. Feinman and L. M.
DeCarli. J. Clin. Invest. 46(9):1451-1460, 19

Replacement of dietary triglycerides containi
long-chain fatty acids by triglycerides contai
medium-chain fatty acids markedly reduced the
capacity of ethanol to produce fatty liver in
After 24 days of ethanol and medium-chain fatt
acids, the increase in hepatic triglycerides
only 3-fold that of controls, whereas an 8-fol
elevation was noted after ethanol and long-cha
fatty acids. The triglyceride fatty acids tha
accumulated in the liver after feeding of etha
with medium-chain fatty acids contained only
small percentage of the medium-chain fatty aci
their composition also differed strikingly fro
that of adipose lipids. In order to study the
mechanism of the reduction in steatosis, oxida
to CO_2 and incorporation into esterified lipi
of ^{14}C-labeled chylomicrons or palmitate-^{14}C
(representing long-chain fatty acids), and of
octanoate-^{14}C (as medium-chain fatty acids) we
compared in liver slices and isolated perfuse
livers, in the presence or absence of ethanol.
Ethanol depressed the oxidation of all substra
to CO_2; medium-chain fatty acids were much mor
oxidized and reciprocally much less esterified
than long-chain fatty acids, with a 100-fold d
ference in the ratio of esterified lipid-^{14}C t
$^{14}CO_2$. In hepatic microsomal fractions incuba
with α-glycerophosphate, octanoate was much le
esterified than palmitate. This propensity of
medium-chain fatty acids to oxidation rather t
esterification represents a likely explanation
for the reduction in alcoholic steatosis upon
replacement of dietary long-chain fatty acids
medium-chain fatty acids.

10599 COMPARATIVE METABOLISM OF COPPER AND
ZINC IN PATIENTS WITH WILSON'S DISEA
(HEPATOLENTICULAR DEGENERATION). (E.) McCall
J. T. (Mayo Clin., Rochester, Minn.), N. P.
Goldstein, R. V. Randall and J. B. Gross. Ame
J. Med. Sci. 254(1):13-23, 1967.

Data from balance studies on patients with
hepatolenticular degeneration and patients wit
cystinuria showed that admin. of D-penicillami
(250 mg every 8 hr.) altered the metabolism of
both Zn and Cu but the mechanism of action was
not the same for the 2 elements. Urinary Cu
excretion was increased to a max. level in 24
compared to several days for max. Zn excretion
A negative Cu balance was produced by this dru
while the Zn balance was actually more positiv
At the same time the serum Cu conc. was decrea
while that of Zn was not affected. Electropho
studies on the complexes isolated from the uri
of patients before and during ingestion of the
drug showed Cu to be associated with albumin a

3 and γ-globulin, but migration of a stainable
pound was not detected from the point of ap-
cation of Zn compounds. A ninhydrin-positive
compound(s) was detected in the urine but none
e present for Cu. These responses were seen
n in patients who had just begun this therapy
in those who had received D-penicillamine for
long as 8 yr.

00 PRESYMPTOMATIC WILSON'S DISEASE. (E.)
Levi, A. J. (Nat. Hosp., London), S.
rlock, P. J. Scheuer and J. N. Cumings.
cet 2(7516):575-579, 1967.

is important to diagnose presymptomatic Wilson's
ease, since the severe consequences of the dis-
er may be prevented by adequate chelation
rapy. Seventeen children from 5 families hav-
members with Wilson's disease were studied to
ect presymptomatic subjects: 7 had clinical
son's disease, 5 were diagnosed as presympt-
tic (homozygotes) and 5 were thought to be
mal or heterozygotes. Kayser-Fleischer rings
e present in symptomatic, but absent in pre-
ptomatic, patients. All presymptomatic homozy-
es had low serum Cu and ceruloplasmin levels,
these estimations could not distinguish them
h certainty from heterozygotes. The pre-
ptomatic state was confirmed by a liver-Cu
c. (performed on liver needle-biopsy specimens)
r 25 mg/100 g dry wt. Two heterozygotes showed
tually normal liver histology and Cu conc.
son's disease must be positively excluded in
siblings of a proven case, all children who
e had a sibling with cirrhosis and all young
ple with chronic liver disease.

01 HEPATIC BLOOD FLOW MEASURED BY THE
KRYPTON-85 CLEARANCE TECHNIQUE. (E.)
tch, A. G. (Harvard Med. Sch., Boston, Mass.),
H. Casey and R. M. Zakheim. Surgery 62(1):
-180, 1967.

^{85}Kr clearance technic (approx. 0.5 mc, dis-
ved in 0.25 ml saline, was admin. by rapid inj.
2-3 sec. duration) with use of external monitor-
and graphic analysis was applied to hepatic cir-
ation in dogs; 3 or 4 flow rates were consis-
tly found in each curve. Comparing total
patic blood flow calculated from simultaneous
patic artery-portal vein inj. with measured
patic venous efflux, a % of error of ± 16.7% was
und. The av. total hepatic flow in a series of
te dogs was 39.1 ml/kg/min. and in 1 chronic
mal it av. 40.2 ml/kg/min. Clearance after
tal vein, hepatic artery or simultaneous inj.
nonstrated a nonuniformity of blood flow and
ggested the presence of an unshared fast flow
e portal vein component, a shared medium flow
e component and an unshared slow flow rate
patic artery component. Radioautography sug-
sted that the portal vein contribution to the
dium flow rate component may be in the periphery
the lobe, but it failed to localize the other
w rate regions anatomically.

10602 STUDY OF SERUM FATTY ACIDS IN THE COURSE OF HEPATOBILIARY DISEASES. (Fr.)
Warembourg, H. (City Hosp., Lille, France), G. Biserte, M. Bertrand, J. Jaillard and G. Sezille. Rev. Int. Hepat. 17(2):79-86, 1967.

Plasma fatty acid levels and partition of plasma lipid fractions were determined in 41 patients with various hepatobiliary diseases (decompensated cirrhosis of alcoholic origin, 26; jaundice due to viral hepatitis, 9; obstructive jaundice, 6. Patients with cirrhosis showed normal total plasma lipid and free fatty acid levels; plasma free cholesterol, glycerol, and phospholipid levels were normal, while cholesterol ester and sterol fractions showed some decrease. The percentage of oleic acid was increased in all plasma lipid fractions; linoleic acid was decreased in sterol and glycerol fractions; the percentage of saturated fatty acids was decreased in glycerol and phospholipid fractions. In patients with viral hepatitis, plasma total lipid and free fatty acid levels were normal, while the sterol fraction was decreased and the phospholipid fraction increased with respect to controls. Oleic acid percentage was increased and linoleic acid percentage decreased in all fractions in these patients. Among patients with obstructive jaundice, plasma total lipid levels were markedly increased (18.3 g/liter) as compared to controls (5.1 g/liter); sterol levels were markedly decreased (9.4%) with respect to controls (43%); free cholesterol, glycerol, and phospholipid levels were 20, 20.4, and 49%, resp., as compared to 8, 14, and 31.5%, resp., in controls. Oleic acid content was increased and linoleic acid content decreased in the principal lipid fractions of these patients. Although the authors can offer no satisfactory explanation for the findings reported, the different results indicate clearly the abnormal state of blood lipids of these patients.

10603 BLOOD PRESSURE RESPONSE TO ANGIOTENSIN AND NOREPINEPHRINE IN PATIENTS WITH HEPATIC DISEASE. (It.) Morandini, G. (U. Florence, Italy), M. Spanedda and L. Spånedda. Minerva Med. 58(38):1794-1798, 1967.

Pressor response to angiotensin and norepinephrine was studied in 20 patients (13 men and 7 women; age 25-73 yr.) with various hepatic diseases, including cirrhosis with ascites (11), acute hepatitis with jaundice (5), and obstructive jaundice (4). With the exception of 4 patients, arterial blood pressure values in this group were at the lower limit of normality. Results were compared to those obtained in a control group of 20 normotensive subjects (11 men and 9 women; 21-53 yr. old). Pressor response was determined according to the Kaplan-Silah method: patients were kept supine for at least 30 min. during which time i.v. glucose (5%) was admin. slowly until stabilization of pressor values; angiotensin II (1 μg/ml) or L-norepinephrine bitartrate (8 μg/ml), both in glucose soln., were then admin. i.v., the speed of infusion being gradually increased until the diastolic pressure increase became stabilized at 20 mm Hg. The dose of each agent required to obtain this effect was expressed as ng/kg/min. The av. dose of angiotensin and norepinephrine required to raise the diastolic blood pressure 20 mm Hg was 28.8 and 254.8 ng/kg/min., resp., in patients with liver disease as compared to 8.4 and 101.3 ng/kg/min., resp., in controls. The differences were statistically significant. Among the possible explanations for the decreased pressor response in patients with hepatic disease are: vascular hyporeactivity state due to hepatic damage; increased inactivation capacity at the plasma level (only with regard to angiotensin); the development of tachyphylaxis in relation to increased production of endogenous angiotensin (limited only to patients with cirrhosis and ascites).

10604 PLASMA ANGIOTENSINASE ACTIVITY IN PATIENTS WITH HEPATIC DISEASES OF VARIOUS CAUSES. (It.) Morandini, G. (U. Florence, Italy), D. Dimich, P. Manca and M. Spanedda. *Minerva Med*. 58(40):1876-1881, 1967.

Plasma angiotensinase activity was determined according to a method described by Landesman *et al*. in 44 patients (27 men and 17 women; age 14-74 yr.) with various types of liver diseases. The group consisted of 11 patients with acute hepatitis and jaundice, 12 with sclerosing chronic hepatitis, 8 with obstructive jaundice, and 13 with cirrhosis and ascites. Twelve clinically healthy subjects (16-40 yr. old) served as controls. Plasma angiotensinase levels in controls ranged from 80-120%. All but 1 patient with acute hepatitis showed a marked increase in plasma angiotensinase levels (142.82 to 204.48%); in 4 patients, a second determination during the regression phase revealed levels within normal limits. Only 2 patients with chronic hepatitis had slightly increased levels (126.36 and 122.04%, resp.). Plasma angiotensinase levels were also increased in 6 patients with obstructive jaundice (120.33-184.5%) and in 8 patients with cirrhosis (143.25-210.87%). The increase in plasma angiotensinase activity in the above-mentioned patients is attributed to 3 causes: enzyme release due to cytolysis of the damaged hepatic cells; reduced biliary elimination due to cholestasis; increased enzyme production due to greater renin and angiotensin formation as a result of activation of the juxtaglomerular apparatus. Although the presence of increased plasma angiotensinase levels in these patients is an interesting laboratory finding, it does not in itself explain the decrease in blood pressure observed in various forms of hypertension accompanied by liver damage.

10605 SERUM LEVELS OF 5'-NUCLEOTIDASE IN DISEASE. (E.) Eshchar, J. (Chicago Med. Sch., Ill.), C. Rudzki and H. J. Zimmerman. *Amer. J. Clin. Path*. 47(5):598-606, 1967.

To investigate the value of serum 5'-nucleotidase
as a diagnostic tool in liver disease, the spec
ificity and sensitivity of this enzyme were det
mined by the Dixon and Purdom method as modifie
by Kowlessar and associates and Young in 391 pa
tients (280 men and women from 14-91 yr. of age
including 1 infant). Alkaline phosphatase was
measured simultaneously. Patients were dividec
into 5 diagnostic groups: 1) biliary tree ob-
struction (27 patients), 2) parenchymatous live
disease (56 patients), 3) bone disease (25 pa-
tients), 4) combination of 3) with either 1) or
2) in the same patient (9 patients), and 5) mis
cellaneous diseases (274 patients). All patien
(7) with obstructive jaundice showed higher alk
line phosphatase levels more frequently than el
vated 5'-nucleotidase levels (5 of the 7). Lev
of 5'-nucleotidase in biliary tract obstructive
disease were similar to those in parenchymal he
tic disease, and levels in bone disease were
slightly elevated. The level of 5'-nucleotidas
appeared less sensitive than alkaline phosphata
as a measure of hepatobiliary disease.

10606 ABNORMALITIES OF SERUM MONOAMINE OXID
IN CHRONIC LIVER DISEASE. (E.) McEw
C. M., Jr. (NIH, Bethesda, Md.) and D. O. Caste
J. Lab. Clin. Med. 70(1):36-47, 1967.

Serum levels of monoamine oxidase were determin
in 119 adults with acute and chronic liver dise
(13 with viral hepatitis, 17 with infectious mo
nucleosis, 48 with nutritional (alcoholic) live
disease, and 41 with hepatomegaly not attribute
to acute hepatitis or alcoholic liver disease).
Elevated enzyme levels were found in patients w
Laennec's cirrhosis, postnecrotic cirrhosis and
massive neoplastic replacement of the liver, bu
not during the acute phases of hepatitis or ext
hepatic biliary obstruction. The increased enz
activity could not be ascribed to hepatocellula
necrosis or dysfunction. Positive correlations
were found between increased enzyme activity an
signs of portal hypertension and/or portal-syst
collateral circulation. Increased enzyme activ
was most closely associated with hepatic fibros
and "sinusoidal" hypertension, the latter estim
by hepatic vein catheterization. It is conclud
that serum monoamine oxidase may be elevated in
liver disease in the absence of congestive hear
failure.

10607 INTRAVENOUS GALACTOSE TOLERANCE TEST
WITH THE USE OF AN ENZYMATIC METHOD F
THE DETERMINATION OF GALACTOSE. (E.) Tengstro
B. (U. Hosp., Uppsala, Sweden), M. Hjelm, C. H.
De Verdier and I. Werner. *Amer. J. Dig. Dis*.
12(9):853-861, 1967.

A galactose-tolerance test is described, which
a modification of the method of Colcher *et al*.;
galactose is admin. by a single rapid i.v. inj.
or infusion (350 mg/kg); galactose values durin
60-80 min. after the admin. are determined in
capillary blood and form an approx. straight li
in a semilogarithmic system; the result is ex-
pressed as theT 1/2 values for galactose. Gala

erminations are made with a galactose oxidase
nod, the test is simple to perform and the re-
s are reproducible. In a series of 75 tests
healthy students and in patients without sus-
ted liver disease, the value was 12.0 ± 2.6
.; results above 17 min. were regarded as ab-
nal. The test was performed on a clinical
ies consisting of the following: 1) 32 patients
n liver cirrhosis; 2) 11 with acute infectious
atitis, studied within the first 2 wk. of onset
jaundice; 3) 11 with metastatic cancer of the
er; 4) 10 with biliary obstruction, due to a
mon-duct stone in 9 and to cancer of the pan-
as without liver metastases in 1; 5) 49 patients
n a wide variety of diagnoses and with abnormal
ues in 1 or more routine liver function tests
ch as bilirubin values above 1.2 mg/100 ml,
aline phosphatases exceeding 2.6 U, etc.); and
patients without apparent liver disease but with
ditions of interest in connection with gal-
ose metabolism, such as peptic ulcer, diabetes,
. The T½ value was abnormal in 34 (89%) of
tests in patients with liver cirrhosis; of
se, 18 had raised bilirubin values, and 13 of
se had a T½ value above 30 min., which was the
n value for the whole group. Among patients
h hepatitis abnormal findings were found in 5
11 (45%). Seven of 11 (64%) with liver
astases had elevated T½ values. The galactose
value was within normal limits in all patients
h biliary obstruction; the mean value for the
up was 12.9 min. Among the 49 patients with
pected but unconfirmed liver disease, the re-
t of the galactose test was abnormal in 13
%), with T½ values ranging between 17.5-37.5
., and a mean of 24.5 min. The result of the
t in the group of patients with diseases not
marily involving the liver showed abnormal
ults in 5 of 18 (29%) cases of pernicious
mia, 2 of 7 (28%) with sideropenic anemia;
f 17 (47%) with cardiac failure; 5 of 22 (23%)
h hyperthyroidism; 5 of 8 (63%) with hypo-
roidism; and 2 of 21 (10%) with peptic ulcer.
is concluded that this test gives valuable
ntitative information about liver function and
s in the distinction between parenchymatous
obstructive jaundice.

08 COAGULATION METHOD IN AN EXPERIMENTAL
LIVER PUNCH BIOPSY. (Rus.) Bogomazov,
I. (2nd Moscow Med. Inst.). *Eksp. Khir.*
st. 12(2):42-44, 1967.

efulness of the electrocoagulation method for
arrest of hemorrhages from liver parenchyma
thoracic wall soft tissue after liver puncture
psy was studied in 10 rabbits (wt. 2000-2500 g).
ctrocoagulation of the puncture canal was per-
rmed through an external rod covered by Bakelite
plus surgical diathermy. For creation of a
osed electrocircuit inj. needle of a record
ringe was connected with one electrode of the
athermy apparatus and inserted under the skin
the hind foot; the other electrode coming from
diathermy apparatus was connected with a
edle-shaped electric knife. When puncture
biopsy was performed without coagulation of the puncture canal (5 rabbits) hemorrhage from canal lasted 8-10 min. with loss of 15-20 ml blood; the puncture canal was filled with massive blood clots, and liver tissue was infiltrated by blood 1.5-2.0 cm from canal wall. Extensive hemorrhages in the puncture canal and the hepatic tissue surrounding the canal were observed microscopically immediately after puncture biopsy. After 7 days, regenerative changes occurred at the site of puncture canal and after 2 wk. connective tissue scar was present. In the case of puncture biopsy with coagulation of the puncture canal (5 rabbits) blood clots were insignificant, there were no tissue hemorrhages and the surrounding hepatic tissue was of normal color and unchanged macroscopic structure; microscopically there were insignificant hemorrhages. One wk. after puncture biopsy the canal showed necrosis, connective tissue and regenerative processes, while after 2 wk. the puncture site could not be detected. Such puncture with modified Vim-Silverman needle was performed on 85 children with no complications noted.

10609 ABSENCE OF RENAL FRUCTOSE-1-PHOSPHATE ALDOLASE ACTIVITY IN HEREDITARY FRUCTOSE INTOLERANCE. (E.) Morris, R. C., Jr. (U. California Sch. Med., San Francisco), I. Ueki, D. Loh, R. Z. Eanes and P. McLin. *Nature* (*London*) 214(5091):920-921, 1967.

Aldolase activity toward fructose-1-phosphate and fructose-1,6-diphosphate was measured in renal tissue from 6 patients (5 men, 1 woman; 53-73 yr.) with nondiffuse renal disorders and in 1 woman (34 yr.) with hereditary fructose intolerance. Tissue specimens were obtained at surgery; aldolase was measured after Sibley and Lehninger; protein was measured by the biuret reaction. Sample turbidity was corrected by subtraction of optical density at 700 mμ from that at 546 mμ, and the net difference was compared with a standard using bovine serum albumin. Enzyme activities were expressed in terms of μmoles glyceraldehyde/g protein/30 min. Values for fructose-1-phosphate and fructose-1,6-diphosphate, in patients were, resp., renal calculus (22.9; 60.4); multiple renal cysts (17.5; 54.8); renal cell carcinoma (23.6; 63.8); tubular adenoma (22.9; 91.1); papillary cyst adenoma (21.9; 71.9); deformity of renal pelvis (23.2; 71.9); hereditary fructose intolerance (0, 40.3); av. (22.0; 69.7). In human renal cortex, aldolase activity toward fructose-1-phosphate was predictably detectable and was 25-33% that toward fructose-1,6-diphosphate. In hereditary fructose intolerance the values were undetectable and diminished, resp. The results support the hypothesis that renal accumulation of fructose-1-phosphate underlies the renal tubular dysfunction induced by fructose in patients with hereditary fructose intolerance. Hepatic and renal fructose-1-phosphate aldolase seems to be controlled by 1 genetic mechanism. A mixing experiment (mixing tissue homogenates from patients with tubular adenoma and hereditary fructose intolerance) gave no evidence that the inactivity of fructose-1-phosphate aldolase in hereditary fructose intolerance results from an enzyme inhibitor present only in hereditary fructose intolerance or from a lack of an activator present in normal renal cortex.

10610 FRUCTOSE-INDUCED HYPERURICAEMIA. (E.) Perheentupa, J. (U. Helsinki) and K. Raivio. Lancet 2(7515):528-531, 1967.

The effect of i.v. or p.o. fructose (0.5 g/kg) was determined in children with hereditary fructose intolerance (3 boys, 3 girls; 15 mo.-11 yr. old), control children (5; 3 boys and 2 girls; 11 mo.-12 yr. old) and a 26-yr.-old man with essential fructosuria. Uric acid levels in both urine and serum rose sharply, indicating increased uric acid production in controls and children with hereditary fructose intolerance; uric acid levels did not rise in the man with essential fructosuria. The rise was associated with increased lactic acid production. It is suggested that this fructose-induced hyperuricemia is produced by intracellular acidosis in the liver caused by overproduction of lactic acid, and that the uric acid comes from free purine nucleotides, RNA and DNA.

10611 GLYCOGENOSIS TYPE II. GLYCOGEN DISTRIBUTION DISTRIBUTION IN TISSUES. (E.) Hug, G. (U. Cincinnati Coll. Med., Ohio) and W. K. Schubert. Arch. Path. (Chicago) 84(2):141-152, 1967.

Tissue specimens (liver, pancreas, kidney, heart, muscle, brain) from 4 children with classical glycogen storage disease, Type 2, were found to have increased conc. of glycogen and deficient activity of lysosomal acid α1,4-glucosidase. In liver, glycogen content (expressed as % of wet tissue wt.) in the normal was 2.0-6.0, compared to a range of 7.8-12.1 in patients with this disease. Also in the liver, the acid α1,4-glucosidase (expressed as μmoles of glucose liberated from glycogen/min./g of tissue) was 0.183 compared to a range of 0.004-0.023 in patients with this disease. Two types of glycogen were found upon electron microscopic examination of the liver; cytoplasmic glycogen, in which the glycogen was freely dispersed throughout the cytoplasm, and lysosomal glycogen, in which glycogen was tightly packed within the membrane-surrounded structures. The majority of cytoplasmic particles was multigranular (multiparticulate glycogen, glycogen rosettes), whereas the majority of lysosomal particles was monogranular; the diameter of the individual glycogen rosette was up to 150 mμ, whereas the diameter of the individual monogranular particle was 20 mμ or less. Liver tissue obtained at autopsy did not show any cytoplasmic glycogen, while the lysosomal glycogen remained unchanged. Acid phosphatase activity could be demonstrated histochemically beneath the membranes which surrounded the structures containing the lysosomal glycogen. However, not more than 10% showed histochemical evidence of acid phosphatase activity.

In the pancreas, abnormal lysosomes were filled with glycogen to a varying degree; a considerabl number of these structures were empty or nearly so, except for granules sometimes linearly arranged on circular, semilunar or stretched-out fragments of membranes. The varying degree of emptiness of lysosomes in the pancreas may refle an artifact caused by the postmortem diffusion c amylase. While loss of lysosomal enzyme activit may explain the electron microscopic observation of abnormal lysosomes, it cannot account for the excessive accumulation of cytoplasmic glycogen i kidney, heart, skeletal muscle and brain.

10612 MORPHOLOGICAL BASES OF ACUTE AND CHRON INTRAHEPATIC CHOLESTASIS. (Fr.) Sotgiu, G. (U. Bologna, Italy), E. Pisi and G. Cavalli. Arch. Mal. Appar. Dig 56(5):397-407, 1967.

Biopsy studies of several patients with chronic, intrahepatic cholestasis secondary to cirrhosis of the biliary pathways confirmed destruction of both canaliculi and major biliary ducts, apparently resulting from an inflammatory process which involved pericanalicular infiltration of both lympho- and plasmacytes, rupturing of the basal membrane, and progressive degeneration and destruction of epithelial cells. In contrast, i 2 patients with acute intrahepatic cholestasis secondary to viral hepatitis, only an obstructiv cholangitis was evidenced, with obstruction due an inflammatory process involving only epithelia cells. These, in turn, were proliferating activ to a sufficient degree to result in repair of th lesions incurred and reestablishment of normal functioning of the biliary pathways. In this second group of patients, there was no indicatio of any involvement of basal membrane or deformat of biliary ducts.

10613 VASCULAR PERMEABILITY IN EXPERIMENTAL KERNICTERUS. AN ELECTRON-MICROSCOPIC STUDY OF THE BLOOD-BRAIN BARRIER. (E.) Chen, H (Nat. Taiwan U., Taipei), C. S. Lin and I. N. Lien. Amer. J. Path. 51(1):69-99, 1967.

Newborn rabbits were subjected to asphyxiation by exposure to 90 vol. % N_2 for 70 min. and thos which survived (approx. 20%) were given a combin inj. of ferritin and conc. bilirubin soln. (0.3 cc of each) within 30 min. or at 5-hr. intervals following recovery from the asphyxiation, in order to study vascular permeability in experimental kernicterus. This experimental kernicter most often selectively involved the ventral nucl of the thalamus and geniculate bodies whose ultra structure was examined. The endothelial cells appeared to have the same characteristics regardless of whether only ferritin or the combined soln. was inj.: the cytoplasm was moderately dense, containing pinocytotic vesicle a 400-800 in diameter, scanty elements of the endoplasmic reticulum of the rough-surfaced type, a few mitochondria, pairs of centrioles and Golgi compl

most evident change in those inj. within 1
of asphyxiation was an increase in the amount
isible pinocytotic activity in the endothelial
s. These pinocytotic vesicles were larger
the controls and began to take up ferritin
in 0.5-1 hr. after inj. Swelling of the in-
ytoplasmic organelles was reduced in severity
pinocytotic vesicles were decreased in number
the basement membrane showed an increase in
ity 3-4 hr. after asphyxia. Both the mito-
dria and the granular endoplasmic reticulum
med their original size and shape almost com-
ely 4 hr. afterwards. Dense bodies were formed
onsiderable numbers.

4 EXPERIMENTAL HEMOCHROMATOSIS. (Rum.)
Vevera, V., D. Lacky, C. Rădulescu, S.
nianu, D. Capşa and I. Iacob. Fiziol. Norm.
12(6):511-518, 1966.

kept on a protein-deficient diet showed in-
sed amounts of Fe in the spleen, liver, and
rdium and the quantity of Fe was increased
ne liver, spleen, and bone marrow of the
. In male rats, hemosiderin was present in
rgans while in pregnant females, only the
en was significantly affected. The greatest
ts of Fe were found in the tissues of rats
ained on protein-deficient diet supplemented
Fe; within 6 mo. the amounts of Fe in the
n and liver of these animals was twice the
l and plasma transferrin was fully saturated
μg%). Rats maintained on a purine-rich diet
emented with vitamin B presented normal Fe
ption, with sideremia varying between 150 and
g% and free transferrin amounting to 150-200
Both males and females had slight tissue
ntation while Fe was significantly increased
e liver and bone marrow of the fetus. In
maintained on a protein-diet supplemented with
d vitamins, the Fe absorption was significantly
than in the animals maintained on a protein-
ient diet. Liver hemosiderin was lower in
ant females than in male rats while intense
ntation was present in fetal tissues. Re-
were confirmed histologically, biochemically
the amount of radioisotope uptake.

AMEBIC LIVER ABSCESS. (E.) Dorrough,
R. L. (Wallace Mem. Baptist Hosp., Pusan,
. Southern Med. J. 60(3):305-310, 1967.

arison of 22 (21 males, 1 female) Korean
of amebic liver abscess and 23 (21 males,
les) Atlanta (Georgia) cases emphasized the
stic disparity between the American and the
c groups. The clinical entity of amebiasis
readily recognized in this country, thus
erican group showed greater chronicity,
ity and mortality. Amoebas were found in
ools of 3 Koreans and 1 American. The
inantly younger male (veteran) Atlanta cases
in age from 7-87 yr. old. Various forms
causative amoeba were found in only small
s in both groups. Other parasites were more frequent in the Korean group. Of the Koreans, 17 had right lobe abscess, 4 had left lobe abscess, 1 had both lobes involved, and 3 had multiple abscesses. Of the Americans, 21 had right lobe abscess, 1 had left lobe abscess, and 1 had multiple abscesses. Diagnostic delay after hospitalization was 2.1 days in Korea and 14.9 days in Atlanta. More complications and deaths occurred in the Atlanta group, that is, only 9.1% in the Korean, but 26.1% in the Atlanta group. Diodoquin is indicated for intestinal amebiasis, with emetine and/or chloroquine for the liver abscess, and supportive broad-spectrum antibiotics. Right lobe aspiration is indicated in uncomplicated cases. With the suggested combination therapy, various previous authors reported: 1) 2% mortality, 2) 3.6% mortality, 3) no deaths in 75 consecutive cases, and, in general, low complication rate for aspirations. Complications of the abscess require special therapy, as do abscesses in the other lobes.

10616 THE EFFECTS OF CONGESTION ON CERTAIN LIVER TISSUE CONSTITUENT WEIGHTS. (E.)
Souser, R. C. (Woman's Med. Coll. of Pennsylvania, Philadelphia), A. L. Edelstein, B. Sigel and H. Menduke. Arch. Surg. (Chicago) 95(2):217-219, 1967.

White Sprague-Dawley CD strain rats (40 males, 20 females) were divided into 2 groups: 1) control animals had a laparotomy, section of the falciform ligament and isolation of the inferior vena cava cephalad to the liver; and 2) test animals had the identical procedure but, in addition, the vena cava was ligated to produce acute liver congestion. The effect of liver congestion upon liver tissue dry wt., fat extracted dry wt., total protein and DNA content was determined. In no instance was there significant interaction between congestion and sex; i.e., there was no evidence that the effect of congestion was any different in males than it was in females. In terms of wet wt., the congested livers were 40% heavier than the control; this difference was reduced to 20% and 23% in terms of dry and fat-extracted dry wt., resp. An increase of 35% in the protein content was observed in the congested liver; this was comparable in magnitude to the increase in wet wt. Congestion influenced the DNA content least; an 11% increase was observed in DNA content in the congested liver. All of these differences were statistically significant. It is concluded that congestion not only increases the wet wt. of liver tissue but also other commonly employed measures (dry wt., fat extracted dry wt., protein and DNA). This experiment emphasizes that a direct measure of cell division is important in experiments where liver regeneration is being appraised.

10617 TOPOGRAPHY OF BLOOD VESSELS AND BILE DUCTS IN THE PORTA OF THE LIVER. (Rus.)
Umbrumiants, O. A. (Sechenov 1st Moscow Order of Lenin Med. Inst.). Vestn. Khir. Grekov. 98(6): 52-57, 1967.

In 49 isolated liver preparations a conditional division of hepatic porta into the region of a hepatoduodenal ligament and of Glisson's pedicles of the hepatic lobes was done for a more precise determination of each variant for different surgery. Portal vena, hepatic artery, and bile ducts were persistent elements of the hepatoduodenal ligament. A typical division of the general stem of the portal vein into right and left vein was found in 42 of 49; in 3 it was divided into left, right paramedial, and lateral vein; in 3 there was proximal displacement of the right lateral vein; e.g., the latter branched out early from the general stem which was divided at the usual site into left vein and right paramedial vein. Therefore, in all these variants, the right vein was absent and replaced in the right lobe by 2 and 3 veins; this should be considered during resection of the right lobe to prevent dangerous hemorrhage. The diminution of the length of general stem of the portal vein with proximal displacement of the right lateral vein should be considered in establishment of portacaval anastomosis. The general stem of the portal vein was located in all preparations at the back of the hepatic artery and bile ducts and headed sideways from left to right and from down up. Bile ducts were located in most preparations at the front and from the hepatic artery, only in 2 cases did the right artery pass at the front of the common hepatic duct. Typical formation of the common hepatic duct from right and left ducts occurred at the level of bifurcation of the portal vein in 32 of 49; in 7 the common hepatic duct was formed from the left duct and right paramedial and lateral ducts showing some variants; in 3 distal displacement of the right paramedial duct was found and distal displacement of the right lateral duct occurred in 4. The hepatic artery was located in all cases at the left end of the hepatoduodenal ligament and headed sideways from left to right. In 28 of 47 the hepatic artery was divided into left and right artery; in 19 the left hepatic artery was absent; in 15 the corresponding artery for segments 2-3 and artery of segment 4; in 4 initially artery of segment 4 and then artery of segment 2-3. In the region of Glisson's pedicles of the hepatic lobes the following variants were observed; in 2 cases transposition occurred from right to left of the right paramedial vein in which it branched out atypically from the left vein; in 2 cases transposition occurred of the right lateral duct and of the duct of segment 7 from right to the left; in both cases indicated the ducts fell atypically into the left duct.

10618 THE SIGNIFICANCE OF BILIARY PRESSURE. (E.) Williams, R. D. (U. Texas Med. Branch, Galveston), J. C. Fish and D. D. Williams. Arch. Surg. (Chicago) 95(3):374-379, 1967.

Biliary pressure was measured with varying degree of obstruction of the common bile duct in dogs; simple obstruction caused little liver damage, dilatation of the extrahepatic ducts and bile pressure elevations related to the degree of obstruction. Pressure elevations were related
the degree of obstruction; pressure required to
elevate serum alkaline phosphatase was less tha
that for bilirubin. Once the bile ducts became
dilated, they remained so although pressure, se
bilirubin level and alkaline phosphatase return
to normal. Infection added to the experimental
obstructed and dilated biliary tract usually ha
no effect on bilirubin or alkaline phosphatase,
but it increased liver damage. Infection occasionally increased existing obstruction. It
prevented dilatation of the extrahepatic ducts
induced simultaneous with obstruction. This re
lationship between obstruction, infection and duct changes warrants more careful clinical observations. Although cholangitis may produce jaundice by liver damage, it usually does so by
increasing obstruction. A review of 200 cases
with jaundice and cholecystitis showed that in
the absence of obvious obstruction of the bile
ducts, thorough exploration and liver biopsy a
indicated.

10619 EXCHANGE TRANSFUSION IN THE TREATMENT OF ACUTE LIVER FAILURE: A PRELIMINARY REPORT. (E.) McKechnie, J. C. (Meth
Hosp., Houston, Tex.), P. S. Bentlif, J. P. Abbott and J. R. Kelsey. Southern Med. J. 60(3):297-300, 1967.

Three cases of severe hepatic coma treated wit
exchange transfusion are described. In the fi
case, an 18-yr.-old white female who had presented with ascites and peripheral edema, the
level of venous blood at the height of deep co
was 264 µg%, compared with a control of 40 µg
She was treated with 1 exchange transfusion of
10 U of fresh oxalated blood; venous blood NH_3
fell to 94 µg%, and coma persisted for 3 days
after exchange. The patient was dismissed in
improved condition, but with elevated bilirub
The second case, a 37-yr.-old white male with
hepatitis (who had received a renal transplan
yr. previously) was treated with 2 exchange t
fusions of oxalated blood. Venous blood ammo
fell from 236 µg% to 100 µg% after the first
transfusion, and he was alert 4 hr. after the
first exchange. The patient died on the seco
day, in hepatic and renal failure. In the th
case, a 55-yr.-old white male was admitted in
severe hepatic coma, with a venous blood NH_3
of 129 µg%; he was treated with 1 exchange tr
fusion, but had no recovery and died, still i
coma, 3 days later, with a level of venous bl
NH_3 of 114 µg%. Massive hepatic necrosis was
evident at autopsy, and was thought to have b
halothane-induced. The experience reported h
compares favorably with the experience of 14
reported cases. It is concluded that exchang
transfusion deserves further evaluation as a
method of treatment in cases of infectious he
titis with supervening hepatic coma and in se
cases of chronic liver disease with potential
reversibility.

0 HEPATIC COMA DUE TO ACUTE HEPATIC NECROSIS TREATED BY EXCHANGE BLOOD-

SFUSION. (E.) Jones, E. A. (Roy. Free Hosp., on), D. Clain, H. M. Clink, M. MacGillivray S. Sherlock. Lancet 2(7508):169-172, 1967.

n patients (3 males, 4 females; 5-68 yr. old) epatic coma due to acute hepatic necrosis were ted with exchange transfusions using 5-58 liters resh blood/patient. In adults, 3-9 liters were nged in any 1 day, and there were 2-15 ex- es on each patient. In 4 patients, the acute ic necrosis was due to virus hepatitis; in 2, llowed multiple exposures to halothane, and it was associated with therapy with a mono- -oxidase inhibitor, phenelzine. Three pa- s showed striking improvement in the level nsciousness and in 2 of these and 1 other was unequivocal improvement in the electro- halogram. Three patients had severe oliguria. patients ultimately died. Initial improve- in the prothrombin-time was not always main- d. Thrombocytopenia was progressive. A e bleeding tendency developed or persisted in atients. The 5-yr.-old child had the most ing improvement in the level of consciousness treatment. In 6 cases, liver histology at sy showed recent gross necrosis of liver and distortion of the hepatic architecture condensation of reticulin to such a degree if survival had followed, macronodular cir- would have been inevitable. In 4 patients, wt. at necropsy was decreased, in 2 to very vels.

FIFTEEN YEARS' EXPERIENCE WITH PORTO-SYSTEMIC VENOUS SHUNTING OPERATIONS.

Foster, J. H. (U. Oregon Med. Sch., Portland) M. Vetto. Amer. Surg. 33(7):514-519, 1967.

erall operative mortality rate after 47 ve portosystemic shunts was 19% and after rgency shunts it was 55%. The 2 most im- t factors in patient survival were found whether the patient was a chronic alcoholic ether the operation was done as an emergency. r, the alcoholic patient survived elective ystemic venous shunting almost as well as nalcoholic, but the long-term survival was icantly decreased in the alcoholic. Age t make a significant difference with elec- erations (av., 49 yr.) but in the emergency (av., 53 yr.) the mortality rate was higher younger patients. Of the 21 operative 15 were alcoholics; cause of death was hemorrhage during surgery in 7 cases, re- esophageal hemorrhage in 2, protracted and/or hemorrhage related to a splenectomy ses and liver failure in 8 cases. Over a of 6 wk.-12 yr., 13 of 40 patients who llowed died; of these, 10 were alcoholics. patients followed, 78% who had elective enal shunting experienced massive recur- morrhage while, conversely, no patient who d elective portacaval shunting had any of rebleeding after hospital discharge.

10622 A RETROPANCREATIC PORTAL-SYSTEMIC SHUNT FOR PORTAL HYPERTENSION IN CHILDREN.

(E.) Martin, L. W. (U. Cincinnati, Ohio). Arch. Surg. (Chicago) 95(3):332-338, 1967.

A retropancreatic portal-systemic shunt is described in which the portal vein is anastomosed to the left renal vein or to the vena cava; this procedure was used in 6 children (1 boy, 5 girls; 14 mo.-9 yr. old) with bleeding esophageal varices and an extrahepatic block of the portal vein, and satisfactorily accomplished portal decompression in each patient. Three variations were used; in 1 case, anastomosis was side-to-side, in 2 the portal vein was anastomosed to the vena cava at its point of junction with the left renal vein, and in 3 the anastomosis was between the end of the portal vein and the side of the left renal vein. In each case, there was a satisfactory fall in portal pressure after operation; the results of a fructose tolerance test, done in each case before and after the procedure, indicated patency of the shunt. There were no complications of the operation and no further bleeding for as long as 4.5 yr. after the operation. This operation is done in an area of minimal collateral vessels, and is in striking contrast to the extreme vascularity and excessive blood loss often encountered during the course of a conventional portacaval or splenorenal shunt operation. A serious potential complication of the operation could be thrombosis of the anastomosis resulting in superior mesenteric venous thrombosis and necrosis of the entire midgut. It is concluded that while the shunt is difficult to perform, it may be life-saving in selected cases where other type shunts are not feasible or have failed.

10623 PERFUSION OF THE LIVER FOLLOWING SIDE-TO-SIDE PORTACAVAL SHUNT. (E.)

Britton, R. C. (Columbia U., New York, N. Y.), A. B. Voorhees, Jr. and J. B. Price. Surgery 62(1):181-188, 1967.

A total of 12 patients (6 male, 6 female; 21-72 yr. old; 11 with cirrhosis and 1 with the Budd-Chiari syndrome) were studied by simultaneous catheterization of the hepatic veins and the hepatic portal veins from 2 wk.-10 yr. after side-to-side portacaval shunt operations. All patients had retrograde hepatic portal flow which was estimated by cineangiography to range from 318-1075 ml/min., with an av. of 668 ml/min. Corrected hepatic vein flows ranged from 27-571 ml/min., with an av. of 246 ml/min. Although the av. percentages of extraction of BSP, O_2, and ammonium were larger from hepatic vein blood than from retrograde portal blood, the av. removal rates of these substances and glucose release from the liver were larger by the retrograde portal route. These findings suggest that retrograde portal flow after side-to-side shunt may result in less efficient perfusion than by the hepatic vein route but that retrograde portal perfusion is quantitatively significant and may be superior in some patients to hepatic vein perfusion.

10624 PREOPERATIVE ASSESSMENT OF PORTAL HYPERTENSION. (E.) Warren, W. D. (U. Miami Sch. Med., Fla.), J. J. Fomon, M. Viamonte and R. Zeppa. Ann. Surg. 165(6):999-1012, 1967.

Hepatic and splanchnic vascular physiologic features were studied preoperatively in 74 patients with either cirrhosis of the liver or presinusoidal portal vein obstruction. Methods used involved estimation of total hepatic blood flow with ^{198}Au, liver-spleen scan, hepatic vein catheterization, splenoportography or indirect portography, visceral angiography and in several cases, umbilical vein catheterization. Splenoportography was the most useful single examination procedure in the preoperative assessment of portal hypertension; with this technic it was possible to establish the diagnosis of portal hypertension, locate collateral veins, including esophageal varices, estimate the vol. of intrahepatic and extrahepatic portal venous flow, and establish the patency, but not occlusion, of the portal vein. Splenoportography was also the best way to grade esophageal varices and assess portal venous flow to the liver. Catheterization of the hepatic vein was especially valuable for study of the seriously ill patient; with both manometric and venographic studies, it was possible to effect the diagnosis of portal hypertension and differential diagnosis of intrahepatic from extrahepatic obstruction of the portal vein, assess portal venous flow to the liver and obtain a definitive differential diagnosis between occlusive obstruction and spontaneous reversal of flow in the portal vein. Characteristic patterns with hepatic venography were identified which clearly delineated either very good or very restricted portal venous flow to the liver. Determination of pressures in the basal state was helpful in interpreting pressures measured during operation. The ^{198}Au technic for estimation of hepatic blood flow showed significant differences between mild (or early) and severe portal hypertension; it was most useful in screening patients with near normal or very low hepatic blood flow. Liver-spleen scan was helpful in assessing the significance of extrahepatic uptake of ^{198}Au in individual patients. Visceral angiography with indirect portography was most useful in postsplenectomy patients and when splenoportography was contraindicated. The ability to define precise vascular physiologic changes in individual patients with portal hypertension is becoming clinically very important.

10625 TRANSUMBILICAL PORTAL DECOMPRESSION. (E.) Piccone, V. A. (Brooklyn VA Hosp., N. Y.) and H. H. LeVeen. Surg. Gynec. Obstet. 125(1):66-72, 1967.

The feasibility of transumbilical portal-systemic shunting for relief of portal hypertension was examined. Anatomic studies on cadavers and clinical studies confirmed previous reports that the umbilical vein is easily reopened to an unexpectedly large caliber and is a direct connection to the main portal flow (by connection with the left branch of the portal vein). High flow rates we
obtained from umbilical catheters in patients
undergoing transumbilical hepatoportography.
Temporary and permanent transumbilical portal-
systemic shunts were constructed in patients wi
portal hypertension, and decompression of the
hypertensive portal system was achieved. A
temporary shunt with a plastic connector and th
portal-systemic pressure gradient was used in 3
patients (for up to 3 days); no ascites or hemo
rhage occurred and portography was successfully
achieved. A temporary shunt using a pump was u
in 2 patients, and flow rates of 450 cm^3 were
easily achieved. Permanent transumbilical port
systemic shunting was achieved in a cirrhotic
patient (46 yr. old) with portal hypertension,
bleeding esophageal varices and ascites poorly
controlled by spironolactone, hydrochlorothiazi
and a low salt diet; the reopened umbilical vei
was anastomosed to the saphenous veins. There
was a reduction of portal pressure from 43 to
cm of H_2O, postoperative angiographic demonstra
tion of the shunt, the obviously patent dilate
vessels clearly visible on the abdominal wall,
cessation of gastro-esophageal bleeding and la
of further ascitic formation in spite of discontinued diuretics and spironolactone. It is
concluded that transumbilical portal-systemic
shunting, temporary or permanent, can offer de
compression with a relatively minor surgical p
cedure. The technic herein described represen
the first use of the reopened umbilical vein o
the adult for portal decompression.

10626 EXPERIMENTAL DATA WITH REGARD TO
SURGICAL TREATMENT OF COMPLICATED F
OF PORTAL HYPERTENSION. (Rus.) Matiugina, 0.
(Gorkii Kirov Med. Inst., USSR). Vestn. Khir.
Grekov. 98(6):71-73, 1967.

Observation of 200 operated animals with esta
ment of different anastomoses by vascular sut
apparatus, showed that venous anastomoses of
mm diameter (in dogs) were the most effective
valuable, while mesenteric-femoral anastomosi
was the most advantageous and could be perfor
by 5 variants. In 95 with mesenteric-femoral
anastomosis performed the most expedient were
variants 1, 2, and 5, when for anastomosis th
central end (Variant 2) was taken, or both en
of the upper mesenteric vein (double mesenter
femoral anastomosis; variant 5), or the perip
end of upper mesenteric vein (Variant 1). In
single cases the femoral vein was sutured wit
of the largest branches of the upper mesenter
vein (Variant 3), and also a T-forming conne
of the peripheral end of upper mesenteric ve
with the femoral or end of the femoral with
enteric vein (Variant 4) was performed. Con
tion of the lower mesenteric vein is possibl
mainly by 3 variants (e.g., connection of th
peripheral or central end of the mesenteric
with the femoral vein, or double mesenteric-
anastomosis); T-forming connection with a sm
diameter of stem is accomplished in the femo
vein in the presence of the large stem, this

le also in the mesenteric vein. Mesenteric-
nastomoses is possible by end-to-end and
pe of T-forming anastomosis of mesenteric
enal and renal into mesenteric. Mesenteric-
nastomosis is confined to the length of
ein and is possible in only 1 variant with
ipheral end of the upper mesenteric vein.
ages from varicose veins of the esophagus
he removal of the spleen and in cases of
cient function of the splenorenal anastomosis
e treated by Tanner's surgery or establish-
powerful anastomosis. Also establishment
r mesenteric-femoral (left and right)
osis, or lower mesenteric-femoral (left),
enteric-renal (in the absence of renal
rombosis) and mesenteric-iliac anastomosis
e accomplished for these conditions. In
0 cases of surgery, lower extremity cir-
n difficulties were absent, and the in-
s showed no severe complications. One dog
day 7 and 2 showed commissure in the
al cavity. Ten days after surgery the
ental dogs did not differ from the healthy
X-ray, spleno- or venomanometry and electro-
raphy were employed in the study. Anas-
showed good permeability in most of the

PHARMACOLOGIC CONTROL OF PORTAL HYPER-
TENSION. (E.) Nusbaum, M. (U.
vania, Philadelphia), S. Baum, P. Sakiyalak
S. Blakemore. Surgery 62(2):299-310, 1967.

ve infusions of several pharmacologic agents
de into the superior mesenteric artery in
of dogs with experimentally constructed
hypertension (which was induced by inj.
heres of 12-35 μ of styrene divinylbenzene
er latex directly into the portal vein).
rine (1 μg/kg/min.), norepinephrine (0.191-
/min.) and angiotensin (0.191-1.0 μg/min.)
lar effects of constriction of the splan-
essels and decrease in portal inflow but
resulting increase in portal outflow re-
and portal hypertension. These agents
sustained portal hypotensive action. Vaso-
(0.019 pressor U/min.-0.382 pressor U/min.)
pressin derivatives, were utilized in
ve infusion and found to produce splanchnic
sm with a decrease in superior mesenteric
portal inflow with a resulting decrease
l pressure. Vasopressin in the dosage
vided a sustained portal hypotensive ac-
en continuously infused. The efficacy
dosages of vasopressin and its derivatives
usly infused through the superior mesen-
tery in achieving a prompt and sustained
the portal pressure was demonstrated.
ressure was decreased 50% in the portal
sive dog and 20% in the normal dog. No
in cardiac output were observed during
sion of vasopressin; no evidence of ischemic
were found in the organs studied by histo-
examination; blood-gas studies of portal
rior mesenteric blood before and during
sin infusion showed no significant change.
A concomitant decrease in superior mesenteric flow av. 58%. A relatively easy and effective method of decreasing portal pressure utilizing technics developed for selective arteriography is given, with a plan for the clinical application in the management of hemorrhage associated with portal hypertension and varices (esophageal).

10628 S-ADENOSYLMETHIONINE FOLLOWING PORTACAVAL ANASTOMOSES. (E.) Baldessarini, R. J. (NIH, Bethesda, Md.) and J. E. Fischer. Surgery 62(2):311-318, 1967.

After end-to-side, but not side-to-side portacaval shunts, adult male Osborne-Mendel laboratory rats were found to have smaller livers, with a decrease of S-adenosylmethionine, both in conc. and total amount. These metabolic defects did not appear in the brain. The livers were not deficient in the enzyme which produces S-adenosylmethionine. When exogenous substrate, methionine, was admin., the livers of rats with portacaval shunts responded quite strikingly to synthesize S-adenosylmethionine. It is suggested that a major factor in producing this chronic metabolic defect is the lack of dietary substrate due to the shunting of substrate-rich portal blood away from the liver. Portal-systemic anastomoses which retain some portal blood flow, while reducing portal hypertension, may produce less hepatic metabolic damage. Moderate dietary supplements of methionine may be of benefit to patients after portacaval anastomoses.

10629 A REVERSE PORTACAVAL ANASTOMOSIS UNDER EXPERIMENTAL CONDITIONS. (Rus.) Bazhenov, V. S. and V. S. Perlin. Eksp. Khir. Anest. 12(2):38-39, 1967.

In 12 dogs observed up to 700 days following establishment of reverse portacaval anastomosis, surgery was followed immediately by exacerbation, urine showed up to 1.85% proteins, in blood, albumin av. decreased to 3.96 mg% and urea av. increased to 25.8 mg%; however, later these indices were normalized. The pressure in s.c. veins of the forearm remained unchanged, while in the inferior vena cava, the av. pressure increased to 201 mm H_2O, and in mesenteric and splenic vein it increased to 184 and 182 mm H_2O. The velocity of portal blood flow and blood flow through the superficial veins of the front and hind leg decreased to 81.5, 24.1 and 36.2, resp., but was subsequently normalized in the first 2; in the last one it remained somewhat delayed for a prolonged time. Reaction to i.v. admin. of lobeline after surgery occurred only after increased doses (up to 5 ml), but could be due to partial destruction of lobeline in the liver. Therefore, reverse portacaval anastomosis was well tolerated and hemodynamic and biochemical blood changes were reversible. Such an anastomosis could be used in clinic, while also being useful in experimental, conditions on the study of the action of different medicinal and toxic compounds directly on liver by their admin. into the hind leg superficial vein.

10630 THE ROLE OF PORTAL BLOOD IN REGENERATION AND FUNCTION OF COMPLETELY REVASCULARIZED PARTIAL HEPATIC AUTOGRAFTS. (E.) Price, J. B., Jr. (Columbia U., New York, N. Y.), A. B. Voorhees, Jr. and R. C. Britton. Surgery 62(1):195-203, 1967.

Partial hepatic autotransplantation using complete transplant revascularization was combined with a 30% hepatic resection in 135 dogs; a control segment with relatively undisturbed blood supply and biliary drainage was present in each animal. Twenty-eight animals survived for at least 6 days, and 8 animals survived for more than 4 wk. One group received mesenteric blood through the transplant portal vein and good transplant regeneration occurred. A second group received caval blood through the transplant portal vein, and slow atrophy was observed. Animals with thrombosis of the portal-vena caval anastomosis showed more rapid atrophy. In spite of receiving portal blood, a transplant with complete bile duct stenosis showed marked atrophy. Ammonia and BSP extractions and glucose release from both segments were compared by sampling with simultaneous hepatic vein catheterization; the atrophic segments showed decreased function in comparison with their normally functioning controls. It is concluded that substances present in portal blood have at least a permissive role in determining hepatic regeneration and function in a system with competing hepatic segments. The feasibility of partial hepatic transplantation has been demonstrated by this study.

10631 PARTIAL HEPATIC AUTOTRANSPLANTATION WITH COMPLETE REVASCULARIZATION IN THE DOG. (E.) Price, J. B., Jr. (Columbia U., New York, N. Y.), A. B. Vorrhees, Jr. and R. C. Britton. Arch. Surg. (Chicago) 95(1):59-64, 1967.

Of 130 mongrel dogs subjected to partial hepatic autotransplantation with complete revascularization using either portal vein or inferior vena caval blood for perfusion, 36 dogs survived over 3 days postoperatively. The longest survivor was in good health at 9 mo., postoperatively. Transplantation involved the left central and lateral lobes with the right lobes being left intact. Liver regeneration was stimulated by resection of the central lobes. Outflow block phenomena accounted for 25% of the fatalities, while pneumonia with or without intussusception, esophageal perforation or peritonitis accounted for another 50%. Thrombosis or twisting of the hepatic vein anastomosis occurred early after operation and resulted in rapid death. Edema of the transplant usually occurred on the fourth or fifth postoperative day and was less marked in those dogs who had undergone operative hypothermia. Both types of revascularization resulted in long-term survivors with good liver function. Autotransplants of the portal-superior-mesenteric group showed good regeneration and liver function, while atrophy of the transplant was consistently observed in transplants receiving no venous blood supply. SGOT values normalized within 2 wk. in long-term survivors after an initial sharp postoperative rise.

10632 ALLOGENIC CANINE LIVER TRANSPLANTATI
WITH CADAVER DONORS. (E.) Fonkalsr
E. W. (UCLA Sch. Med., Los Angeles, Calif.),
H. Ono, O. A. Shafey, W. L. Joseph, J. Tocorna
and W. P. Longmire, Jr. Surgery 62(2):333-339
1967.

Hepatic allografts obtained from cadaver donor
were transplanted orthotopically in 15 dogs an
heterotopically in 9 dogs in order to study th
technical problems which could be anticipated
in clinical liver transplantation. Extracorpo
perfusion was used while the donor liver was e
cised; asanguinous hypothermic perfusion of th
graft was performed until the venous effluent
clear. Only 2 dogs survived longer than 48 hr
after transplantation. Prolonged hepatic isch
resulting in cellular disruption and venous co
gestion appeared to the major cause of death.
Inadequate hepatic perfusion during and after
transplantation may have also hastened death.
Hypotension immediately following hepatic veno
declamping and restoration of blood flow to th
graft seemed to be related to the release of
dentified metabolites into the circulation.
pressors and bicarbonate were only of tempora
benefit in correcting shock, even in animals
ceiving heterotopic grafts. Additional studie
to evaluate the feasibility of cadaver liver
transplantation in dogs and other species wou
appear to be indicated before extensive clini
trials of liver grafting are performed.

10633 ORTHOTOPIC CANINE LIVER HOMOTRANSPL
TION WITHOUT VENA CAVAL INTERRUPTIO
(E.) Fonkalsrud, E. W. (U. California, Los
Angeles), H. Ono, O. A. Shafey and W. P.
Longmire, Jr. Surg. Gynec. Obstet. 125(2):31
327, 1967.

Hepatic allografts were transplanted orthotop
in 25 adult mongrel dogs without interruption
the recipient's vena cava or use of external
vascular shunts for splanchnic decompression.
The donor dogs were anesthetized and the av.
of hepatic anoxia was 55 min. The portal vei
and hepatic artery of the graft were perfused
with hypothermic buffered Ringer's lactate so
until the venous effluent was clear. Twenty-
of 25 dogs survived at least 24 hr., and 7 li
for more than 1 wk. The longest survival per
were 94 and 106 days. Biochemical studies we
not helpful in distinguishing graft rejection
from hepatocellular injury due to azathioprin
Similarly, upon histologic study, it was diff
to define clearly changes which were immunolo
mediated from those caused by mechanical phen
ena or drugs. Mononuclear cell infiltration
usually seen with rejection was not prominent
the livers of animals that died 3 wk. or more
after transplantation. Hepatic venous outflo
obstruction appeared to be directly related t
the duration of hepatic anoxia during transpl
tion and was 1 of the major factors causing e
death in the dogs. Hypothermic perfusion of
liver with buffered electrolyte soln. during

d of ischemia appeared to reduce the severity
's complication and to permit longer periods
atic anoxia with return of liver function.
rition and sepsis were the leading causes
th in dogs who lived more than 3 wk.

HOMOTRANSPLANTATION OF THE CANINE LIVER
AS AN ORTHOTOPIC VASCULARIZED GRAFT.
Baik, T. Y. (Pusan Nat. U., Coll. Med.,
, Y. D. Kim, C. W. Eun, E. S. Park and Y. U.
J. Korean Med. Ass. 9(8):693-702, 1966.

een liver homotransplantations were performed
34 healthy mongrel dogs of about 20 kg wt.
17 survived for more than 2 hr.; 1 for 2 hr.
min. and the other for 13.5 hr. Autopsy
ed pulmonary embolism, cardiac infarction,
clots in the right atrium and ventricle,
intestinal hemorrhage and a markedly con-
liver in all the dogs. In these homo-
lantation experiments, 3 new technics have
evised. 1) A method anastomosing anteriorly
osterior aspects of the posterior walls of
ferior vena cava stumps below the recipient's
agm and above the transplanted liver. In
rocedure, the Kelly forceps which clamped
ne recipient diaphragm and the stump of
or vena cava were pulled outside the peri-
cavity so as to turn the posterior aspect
posterior wall of its vessel foreward. 2)
structing the extracorporeal bypass, the
l end of the polyethylene tube was directly
ed into the visceral stump of the portal vein
renal stump of the inferior vena cava.
e the stumps maintain venous return to the
anastomoses were carried out between both
veins of the transplanted liver and the
nt, and between the inferior vena cava of
nsplanted liver and the recipient. It is
led that these procedures shorten the cir-
y blocking time to the utmost limit, and
trauma to a minimum.

TEMPORARY EXTRACORPOREAL USE OF HETER-
OLIVER IN REANIMATION OF PATIENTS WITH
EPATIC INSUFFICIENCY. (Rus.) Savitskii,
Kirov Order of Lenin Med. Acad., Leningrad,
A. P. Kolesov, F. V. Balliuzek, M. O.
, V. I. Skorik, I. M. Markelov and Z. K.
Vestn. Khir. Grekov. 98(5):75-80, 1967.

meability of cellular membranes of heterol-
iver during hypoxia, conditioned by technical
antation (in large donor cats, ligation of
erior vena cava, hepatic artery and common
ct, isolation of the liver, washing, cool-
tracorporeal connection to femoral vessels
recipients, dog, monkey), was evaluated
activity of isoenzyme LDH in the donor
control) and in perfusate after different
of hypoxia. One hr. of hypoxia caused
ance of the permeability of cellular
es and discharge of LDH_5 from liver cells;
ctivity of LDH of donor blood before ex-
of liver was 0.38-0.45 μM/ml/min. substrate,
while LDH activity in the perfusate after 1 hr. of hypoxia was 0.95-1.0 μM/ml/min. substrate. After reduction of hypoxia to 25-30 min. permeability of cellular membranes was not affected. For the preservation of the structure and function of hepatic cells during liver washing the time of hypoxia, and the technic of perfusion are important; e.g., perfusate pressure in the portal vein should not exceed 160 mm H_2O column, osmotic pressure of perfusate (gelatinol basic ingredient) should be 300-315 mosmoles/liter, and pH 7.3-7.4. Immunologic activity of heterologous liver studied in 3 dogs and 1 monkey with extracorporeal connection of cat liver for 3 hr. showed an absence of complement-fixing antibodies to the antigen of cat liver, and intracutaneous admin. of allergen did not induce a positive allergic reaction. In clinical study the connection of donor heterologous liver (large young dogs), isolated by the above method, could be artery-vena (at least profitable due to possible severe hypotension), vena-vena and vena-artery (most expedient) with the help of apparatus for artificial circulation. For connection of the heterologous liver with the perfusion apparatus it is sufficient to use the femoral vein for intake and the large s.c. vein of the hand or leg for return. Temporary extracorporeal connection of heterologous liver was accompanied in all 4 patients (1 with hepatic and 3 with hepatorenal insufficiency) by temporary improvement in general condition and biochemical indices [in blood bilirubin, residual N and free hemoglobin (at hemolysis) content was reduced, aspartateamino- and alanineaminotransferase activities were decreased, and, in some, indices of acid-alkaline condition were normalized]. With an absence of irreversible damage in vital organs and systems the temporary use of heterologous liver is effective for reanimation of patients with acute hepatic insufficiency. All 4 patients (2 males, 2 females, age 12-56 yr.), discussed in detail, died, 3 showing irreversible changes of vital organs and systems.

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electrophoretic studies, a significant increase serum naphthylamidase B activity, a zone ich migrates more slowly than naphthylamidase and which is electrophoretically indistin- ishable from the naphthylamidase pregnancy zyme, oxytocinase, was found in 18 of 34 women o had been taking oral contraceptives for riods of 3 mo. - 3 yr. A similar increase was monstrable in only 1 of 31 controls, who was und to be pregnant. When incubated with bbit antiserum, sera with strong naphthylamidase activity in the presence of severe burn or eatment with either phenothiazine or oral ntraceptives lost all activity in zones A, B d C, although the B zone remained unaffected in egnancy sera incubated in the same way. It is ncluded that the increase of serum naphthyl- idase B activity in some patients receiving al contraceptives appeared to represent a nspecific indication of liver damage or distur- nce of liver metabolism. Both the absence of discernible dose-response relationship and the ilure of some individuals to develop the action suggested the further possibility that sceptibility to these compounds was genetically termined.

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aracrystalline mitochondrial inclusions were ound in electron micrographs of the livers from patients with known primary liver disease; 1, chronically-jaundiced 58-yr.-old male with ubin-Johnson syndrome and the other a 48-yr.- ld female with chronic viral hepatitis. In ddition, similar inclusions were found in ecrospy material from 3 patients without pri- ary liver disease but who showed histological vidence of liver injury. They were absent at ecropsy in 2 patients in whom no evidence of istopathologic change could be found. Post- ortem fixation of the liver in glutaraldehyde ollowed by secondary fixation in osmium tetroxide as adequate to allow evaluation of cell ultra- tructure up to 4 hr. following death. The para- rystalline mitochondrial inclusion consisted of ods or filaments measuring 60-80 Å in diameter, rouped in clusters, exhibiting geometric ymmetry and may exist in the form of coiled elices. It is concluded that their presence onstitutes evidence of hepatic cellular damage.

0739 THE INFLUENCE OF THE MICROBIAL FLORA ON LIVER INJURY AND ASSOCIATED SERUM γ-GLOBULIN ELEVATION. A STUDY IN GERM-FREE RATS TREATED WITH 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE. (E.) Bauer, H. (Walter Reed Army Inst. Res., Washington, D. C.), F. Paronetto, R. F. Porro, A. Einheber and H. Popper. Lab. Invest. 16(6): 847-857, 1967.

Germ-free and conventionalized rats were inj. with 3'-methyl-4-dimethylaminoazobenzene for 6 wk. to investigate the influence of the intestinal flora on the evolution of liver disease, and to determine whether the hypergammaglobulinemia which accompanies chronic liver disease reflects excess antibody formation to bacteria. The livers, spleens and axillary and hepatic lymph nodes of the animals were subjected to histologic, autoradiographic (3H-thymidine) and immunocytochemical analysis, and their sera to immunologic studies. Germfree rats showed a greater tendency towards liver injury and cirrhosis than the conventionalized animals. This difference in susceptibility to hepatic injury was paralleled by a wt. gain of the livers in 3'-methyl-4-dimethylaminoazobenzene-treated conventionalized animals, while those of the germfree rats did not enlarge, despite greater proliferative activity. In the germfree control animals, the serum γ-globulin level and the immunologic activity of lymphatic tissue were less than in the conventionalized controls, but the increase in both parameters induced by sustained liver injury was of equal degree in both types of animal and was manifested morphologically, chiefly in the spleen and in the perihepatic nodes. This suggests that the microflora was not essential for the immune response resulting from 3'-methyl-4-dimethylaminoazobenzene-induced chronic liver injury and the ensuing hypergammaglobulinemia. Nonmicrobial factors, perhaps related to hepatocyte breakdown products alone or in association with the hepatotoxic agent, may induce a direct or adjuvant-type immune response resulting in serum γ-globulin elevation.

10740 THE INFLUENCE OF TESTOSTERONE ON THE INDUCTION OF FATTY LIVER BY METHIONINE DEFICIENCY. (E.) Sidransky, H. (U. Pittsburgh Sch. Med., Pa.), E. Verney and R. F. Egan. Lab. Invest. 16(16):858-863, 1967.

Male and female Wistar and Sprague-Dawley rats were force-fed either a basal complete diet or a methionine-deficient diet; the basal diet consisted of 9.23% essential amino acids, 8.12% nonessential amino acids, 4% salt mixture, 5% vitamin-sucrose mixture, 5% corn oil, 1.5% cod-liver oil and 67.15% dextrin; the vitamin mixture contributed 100 mg choline chloride/100 g of diet. The methionine-deficient diet had methionine (0.6% DL-methionine) replaced by an equal amount of dextrin. Animals were castrated by removal of gonads (testes or ovaries) approx. 2 wk. before the experimental diet feeding was begun; after castration, the animals received either no inj. or a s.c. inj. of testosterone propionate (6 mg) every second day until the end of the experiment. Mature intact and castrated female rats, but not intact male rats, developed a marked degree of fatty liver with a periportal distribution of the lipid when force-fed a choline-containing, methionine-deficient diet for 3 days; castrated male rats were no longer protected and developed a periportal fatty liver when fed the methionine-deficient diet. Intact female rats fed the methionine-deficient diet containing 8 nonessential amino acids developed a more severe degree of fatty liver than female rats fed the methionine-deficient diet containing glutamic acid in place of the other nonessential amino acids. Testosterone propionate admin. to castrated female or castrated male rats fed the methionine-deficient diet protected against the marked increase in liver lipid. The results indicated that testosterone in the male is most probably responsible for the protective effect in male rats against fatty liver due to a methionine-deficient diet.

10741 HEPATIC CHANGES PRODUCED BY A SINGLE DOSE OF ENDOTOXIN IN THE MOUSE. LIGHT MICROSCOPY AND HISTOCHEMISTRY. (E.) Levy, E. (Johns Hopkins U. Sch. Med., Baltimore, Md.) and B. H. Ruebner. Amer. J. Path. 51(2):269-285, 1967.

The liver lesions produced in pathogen-free mice by a single sublethal i.v. or i.p. inj. of endotoxin were studied during a 24-hr. period by light microscopy and histochemistry. The endotoxin used was Difco Bacto lipopolysaccharide *Escherichia coli* 0111:B4. I.v. inj. were given into the tail vein of 44 mice; control animals were given 0.1 ml of sterile pyrogen-free water. Experimental mice were divided into 2 groups: those of the first group received 100 µg of endotoxin, and those in the second, 300 µg. In addition, 32 were given endotoxin i.p.; 10 received 500 µg and 22 received 700 µg. Animals were sacrificed at 30 min., 1 hr., 4 hr. and 24 hr. after endotoxin inj. Qualitatively, lesions produced by i.p. inj. of endotoxin were similar to those seen after i.v. inj.; different dose levels also resulted in no essential differences. The 30-min. specimens, especially after i.p. inj., showed the mildest changes; despite variations at each time interval, a general progression of the lesions with time was discernible. Early changes included appearance of polymorphonuclear WBC in the sinusoids, swelling of Küpffer cells and platelet thrombi; later, there was aggregation of WBC and fibrin around Küpffer cells, with some apparent necrosis. Congestion and an inflammatory infiltrate were noted in the large veins. Well-marked and rapidly developing metabolic disturbances were suggested by glycogen depletion, fatty change and alterations in the localization and intensity of acid and alkaline phosphatase. The possible relationship of these changes to the mode and site of action of endotoxin and its distribution is discussed and compared with the results recorded in the literature by other methods.

10742 EFFECT OF PREDNISOLONE TREATMENT OF PREGNANT RATS ON FETAL LIVER STRUCTURE AND METABOLISM. (E.) Hill, R. B., Jr. (U. Colorado, Denver) and W. R. Blackburn. Lab. Invest. 17(2):146-154, 1967.

Pregnant Sherman-strain rats were treated with 5 mg of prednisolone daily during the final 15 days of pregnancy. Plasma free fatty acids of the dams were appreciably elevated; fetal livers contained no consistent increase in lipid glycerides, but an increase in osmiophilic droplets was regularly observed with both light and electron microscopy. Body wt. and liver wt. decreased in fetuses from steroid-treated animals. Ultrastructural alterations in the fetal liver cells included abnormal mitochondria shapes and alterations in the cristal membranes, an increase in large osmiophilic droplets, and a pattern of very intimate endoplasmic reticulum-mitochondrial relationship. There were slight increases in hepatic protein and water content in steroid-treated rat fetuses; the increase in protein content paralleled that observed in adul animals, but the water content of the dams' livers was unaffected by steroids.

10743 THE STUDY OF FREE FATTY ACID DYNAMICS IN THE PERFUSED ISOLATED LIVER FOLLOWING CCl_4 INTOXICATION. (Rum.) Costiner, E. (Endocr. Inst., Bucharest), L. Vaisler and E. Dinulescu. Stud. Cercet. Endocr. 18(2): 151-157, 1967.

When rats (260-300 g body wt.) were given CCl_4 for 12 hr., the conc. of free fatty acids in the perfusion medium of the isolated rat liver was practically unchanged for the duration of the experiment (180 min.), while free fatty acids in the perfusion medium of livers from rats with chronic (30 days) CCl_4 intoxication, decreased for the first 90 min. and then increased slightly. The free fatty acid pattern for animals with CCl_4-induced cirrhosis was similar with that of animals subjected to acute intoxication. In controls, the conc. of free fatty acids in the perfusion medium of the isolated rat liver started to increase gradually after 1 hr. The addition of free fatty acids to the perfusion medium of the isolated liver from treated (CCl_4) and untreated animals produced rapid decrease of free fatty acid values during the first hr. after which the decrease became gradually slower. The results explain certain aspects of liver fatty degeneration caused by intoxication with CCl_4 by revealing that the alterations of the liver function noticed during the first few hr. following admin. of the agent remain unchanged with time.

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10767 CHANGES IN CARBOHYDRATE METABOLISM IN THE ISOLATED AND PERFUSED LIVER POISONED WITH CCl_4 TO DIFFERENT EXTENTS. (Rum.) Vaisler, L. (Endocr. Inst., Bucharest), E. Costiner and C. Gheorghiu. Stud. Cercet. Endocr. 18(4): 329-333, 1967.

10768 HISTOCHEMICAL AND BIOCHEMICAL BEHAVIOR OF β-GLUCURONIDASE IN HEPATIC PARENCHYMA INJURIES PRODUCED BY SINGLE DOSES OF CARBON TETRACHLORIDE IN THE RAT. (Ger.) Rath, F. W. (Martin Luther U., Halle-Wittenberg, Germany) and R. Nilius. Exp. Path. (Jena) 1(4):195-209, 1967.

10769 CARBON TETRACHLORIDE-INDUCED LOSS OF MICROSOMAL MESSENGER-RIBONUCLEIC ACID ACTIVITY. (E.) Wekşler, M. E. (NIH, Bethesda, Md.) and H. V. Gelboin. Biochim. Biophys. Acta 145(1):184-187, 1967.

10770 INCREASED INCIDENCE OF HEPATOMA IN MICE WITH CHRONIC SCHISTOSOMIASIS MANSONI TREATED WITH A CARCINOGEN. (E.) Domingo, E. O. (Western Reserve U., Cleveland, Ohio), K. S. Warren and R. J. Stenger. Amer. J. Path. 51(3): 307-321, 1967.

10771 LIVER AND SERUM VITAMIN B_{12} CONCENTRATION OF RAT DURING INGESTION OF 3'-METHYL-4-DIMETHYLAMINOAZOBENZENE. (E.) Doctor V. M. (U. Houston, Texas), J. P. Chang and M. K Richards. Cancer Res. 27(3)(Pt. 1):546-548, 1967.

10772 DISTRIBUTION OF RADIOACTIVITY WITHIN THE HEPATIC CELL AFTER ADMINISTRATION OF LABELED 3-METHYLCHOLANTHRENE. (E.) Bresnic E. (Baylor U. Coll. Med., Houston, Texas), R. A Liebelt, J. G. Stevenson and J. C. Madix. Cancer Res. 27(3)(Pt. 1):462-468, 1967.

10773 REACTION OF SPECIFIC ANTIBODY WITH 2-ACETYLAMINOFLUORENE FIXED IN LIVER CELLS. (E.) Tanigaki, N. (Roswell Park Mem. Inst., Buffalo, N. Y.), M. Kitagawa, Y. Yagi an D. Pressman. Cancer Res. 27(4):747-752, 1967.

10774 SIGNIFICANCE AND MECHANISM OF THE BINDING OF 2-ACETYLAMINOFLUORENE AND N-HYDROXY-2-ACETYLAMINOFLUORENE TO RAT-LIVER RIBONUCLEIC ACID IN VIVO. (E.) Irving, C. C. (VA Hosp., Memphis, Tenn.), R. A. Veazey and R. F. Williard. Cancer Res. 27(4):720-725, 196

10775 THE BINDING OF METABOLITES OF AMINOAZ DYES TO RAT LIVER DNA IN VIVO. (E.) Dingman, C. W. (NIH, Bethesda, Md.) and M. B. Sporn. Cancer Res. 27(5)(Pt. 1):938-944, 1967.

10776 THE EFFECT OF LIVER INTERFERENCE ON MAMMARY TUMOUR INDUCTION BY 7,12-DIMETHYLBENZ(a)ANTHRACENE IN SPRAGUE-DAWLEY RATS. (E.) Kernohan, I. R. (U. Med. Bldg., Aberdeen, Scotland), M. S. Inglis and D. N. Wheatley. Brit. J. Cancer 21(1):214-217, 1967.

10777 BINDING OF AMINOAZO DYES TO SERUM ALBUMIN AND TO NUCLEAR PROTEINS OF RA LIVER. (E.) Dijkstra, J. (Nat. Chem. Res. Lab., Pretoria, South Africa) and H. M. Griggs. Brit. J. Cancer 21(1):205-213, 1967.

10778 THE ISOLATION OF NUCLEI FROM RAT LIVE DURING AMINOAZO DYE CARCINOGENESIS. (E.) Griggs, H. M. (Nat. Chem. Res. Lab., Pretoria, South Africa) and J. Dijkstra. Brit. J. Cancer 21(1):198-204, 1967.

10779 THE INTERACTION OF TRITIATED p-DIMETH AMINO-AZOBENZENE WITH RAT LIVER NUCLE PROTEINS. (E.) Rees, K. R. (Univ. Coll. Hosp. Med. Sch., London) and J. S. Varcoe. Brit. J. Cancer 21(1):174-177, 1967.

10780 NUCLEAR RNA SYNTHESIS IN RAT LIVER DURING THE EARLY STAGES OF CHEMICAL

CINOGENESIS. (E.) Godwin, E. L. R. (Univ.
I. Hosp. Med. Sch., London), K. R. Rees and
S. Varcoe. Brit. J. Cancer 21(1):166-173,
7.

81 VARIATIONS IN ULTRASTRUCTURAL NUCLEAR
CHANGES IN HEPATOCARCINOGENESIS. (E.)
boda, D. (U. Kansas Med. Ctr., Kansas City),
Racela and J. Higginson. Biochem. Pharmacol.
4):651-657, 1967.

82 INCREASED EFFICACY OF LIVER CHROMATIN
AS A TEMPLATE FOR RNA SYNTHESIS AFTER
INISTRATION OF 3-METHYLCHOLANTHRENE. (E.)
ix, J. C. (Baylor Univ. Coll. Med., Houston,
.) and E. Bresnick. Biochem. Biophys. Res.
mun. 28(3):445-452, 1967.

10783 THE COVALENT BINDING OF METABOLITES OF TRITIATED 2-METHYL-4-DIMETHYLAMINOAZOBENZENE TO RAT LIVER NUCLEIC ACIDS AND PROTEINS, AND THE CARCINOGENICITY OF THE UNLABELLED COMPOUND IN PARTIALLY HEPATECTOMISED RATS. (E.) Warwick, G. P. (Royal Cancer Hosp., London). Europ. J. Cancer 3(3):227-233, 1967.

10784 FORMATION OF ANOMALOUS ANTIGENS IN THE EARLY STAGE OF CARCINOGENESIS IN THE RAT LIVER. (Rus.) Korosteleva, T. A. (Petrov Res. Inst. Oncol., Leningrad, USSR) and L. L. Khundanova. Vop. Onkol. 13(5):85-87, 1967.

10785 ULTRASTRUCTURAL CHANGES PRODUCED BY TRIPARANOL IN MORRIS 5123 AND NOVIKOFF HEPATOMAS. (E.) Rubright, W. C. (U. Chicago, Ill.), O. Keller and Z. Hruban. Cancer Res. 27(1):165-171, 1967.

10786 THE SALICYLATE TEST IN POSTVIRAL CHRONIC HEPATITIS. (Rum.) Zalaru, M. C. (Students Polyclinic, Bucharest). Med. Intern. (Bucur.) 19(1):59-66, 1967.

Urinary salicylate excretion was determined every hr. for 3 hr. in 70 patients (19-32 yr. old) with chronic hepatitis and in 12 controls, following p.o. admin. of 1 g sodium salicylate and 1 g sodium bicarbonate in 500 ml water. In 48 cases of stabilized postviral hepatitis, urinary salicylate excretion was significantly higher than normal in urine collected in the first and third hr., while in 19 cases with active postviral hepatitis the urinary excretion during the second and third hr. was practically normal, while during the first hr. it was slightly but significantly increased. In 3 cases with chronic cholangiohepatitis urinary salicylate excretion was similar with that in postviral hepatitis. There were no pH differences between 15 selected patients and controls following admin. of salicylate, which demonstrates that the excess salicylate found in the urine of these patients was not due to pH variations. Since urinary salicylate excretion was higher in the stabilized (regressive) form of postviral hepatitis than in the active form, the salicylate test may be used for determining the stage of the disease. The presence of regenerating liver tissue may explain the differences in urinary salicylate excretion between these 2 forms of postviral hepatitis.

10787 POTENTIAL SERUM ALDOLASE ACTIVITY, A NEW CHARACTERISTIC OF EPIDEMIC HEPATITIS. (Rum.) Anghel, A. S. (Dr. V. Babes Hosp., Bucharest). Stud. Cercet. Inframicrobiol. 17(4): 275-278, 1966.

Undiluted serum aldolase activity in 109 patients with icterogenic viral hepatitis was 85-120 U (104 U av.) while diluted (1:5) serum aldolase activity in the same patients varied between 145 and 490 U (275 U av.); in 1 case of nonicteric viral hepatitis the resp. figures were 120 and 500 U. This activity is measurable only in diluted serum, and its variations, from case to case, are significantly wider than the kinetic activity of the undiluted serum. The comparative determination of aldolase activity in diluted and undiluted serum suggests new possibilities for the diagnosis, prognosis and differential diagnosis of epidemic hepatitis.

10788 PERCENTAGE OF CASES WITH PARENTERAL MECHANISM OF INFECTION IN TOTAL EPIDEMIC HEPATITIS INCIDENCE. (Rus.) Khomiakov, A. I. (District Sanit.-Epidemiol. Station, Riazan Reg. USSR). Zh. Mikrobiol. 44(7):28-31, 1967.

Vaccination index for the district, urban, and rural regions in 1959-1964 varied between 0.6-1.5, 0.7-2.0 and 0.4-1.3, resp., and the morbidity index/10,000 population between 0.7-1 0.8-2.3 and 0.7-1.6, resp. Therefore, there wa no direct relation between the increase in vira hepatitis morbidity and vaccinations. Parenter mechanism of transmission of hepatitis was foun in 54 of 747 patients with hepatitis (being 7.2 of total morbidity of viral hepatitis), of whom 19 were in urban and 35 in rural areas. Yr. av morbidity of hepatitis for the district was 14.6, 18 for urban and 13.2 for rural districts 10,000 population; while yr. av. intensity index of morbidity of parenteral hepatitis for th district was 1.1/10,000 population (for urban 1.3 and 1.0 for rural). Fecal-oral infection was found in 519 patients, while in 174 the mechanism of infection remained unknown. Viral hepatitis morbidity intensity index was for children (up to 14 yr. old) 27.4 and for adults 9.1/10,000 population; the resp. values for intensity index of morbidity of parenteral hepati were 1.6 and 0.9/10,000 population with an av. district index of 1.1. In children under 1 an adults over 60 morbidity of parenteral hepatit was absent, though the morbidity for these age groups was 59 and 51.3/10,000 population, resp. Rise in morbidity was evident from September-January (6.7%-14.1%, being the highest in December), followed by a decrease from March-August (6.1%-4.3%); seasonal index was 1.4. Therefore parenteral mechanism of transmission hepatitis is not the leading one in the total morbidity of epidemic hepatitis.

10789 THE VARIATIONS OF MICROELEMENT GALLI IN PATIENTS WITH EPIDEMIC HEPATITIS. (Rum.) Belozerov, E. S. (Med. Inst., Sverdlov USSR). Stud. Cercet. Inframicrobiol. 17(4): 279-284, 1966.

Colorimetric determination of Ga in 217 patien (106 men and 111 women, 19-40 yr. old) with various forms of hepatitis revealed an increas of the element in the blood of all patients wi stabilized disease, regardless of severity; ho ever, the increase was greater in 62 patients with severe forms of hepatitis. Blood Ga conc increased during regression of the disease and in patients with severe and 66 cases with mild hepatitis, it became normal during clinical remission. Urinary Ga excretion, which was no mal in patients with stabilized disease, increased significantly during regression of hepatitis and returned to normal only in cases with mild forms of the disease. In patients with stabilized and regressing disease of mild and medium severity (89 cases), fecal Ga elimination was decreased but became normal du ing clinical remission, while in patients with severe disease, fecal Ga excretion remained be low normal levels. The results suggest that t variations of Ga in the blood, urine, and fece of patients with hepatitis are related to the severity of the disease.

0 BILIRUBIN FRACTION IN THE COURSE OF
EPIDEMIC HEPATITIS. (Cz.) Duliček, K.
rles U., Hradec Kralove, Czechoslovakia),
lodr and M. Horák. Cas. Lek. Cesk. 106(15):
400, 1967.

levels of free bilirubin, bilirubin mono-
uronide, and bilirubin diglucuronide in the
d of 20 patients with the jaundice type of vi-
hepatitis were followed for 5 wk. The blood
les were collected weekly, analyzed by the
od of Eberlein, and the results expressed in
total bilirubin. During the first wk. of
titis bilirubin diglucuronide represented
± 6.6% of total bilirubin. Its proportion
eased further in the course of the disease,
hing a max. (64.0±16.1) in the fifth wk.
proportion of bilirubin monoglucuronide de-
sed during the same time from 19.7±15.5 to
±9.4%. The av. levels of free bilirubin were
er (17.1-27.8%) than those of bilirubin mono-
uronide during the entire observation period.

1 THE COURSE AND OUTCOME OF FORMES
FRUSTES AND ANICTERIC FORMS OF EPIDEMIC
TITIS IN CHILDREN. (Rus.) Tret'iakova,
. (2nd Moscow Med. Inst.). Vop. Okhr.
rin. Dets. 12(5):18-22, 1967.

31 children, 80 had formes frustes and 151
teric form of viral hepatitis, 100 with a
al mild form were used for controls. Age
ed from 1-14 yr. with 59.7% being 2-5 yr.
Clinical manifestations of forme frustes of
tious hepatitis are similar to those in
al forms. However, in the majority of the
nts they were expressed very slightly. In
cases the formes frustes and anicteric forms
ral hepatitis could pass without disturbance
e general patient condition and without
ctive complaints. Basic symptoms in such
are hepatomegaly, and sometimes splenomegaly,
lso biochemical blood shifts. The distinc-
characteristic of formes frustes and an-
ic forms of viral hepatitis in children is
uick disappearance of clinical manifestations
ssary at diagnosis). However, in a number
ses even at release (30-35 days) some re-
l symptoms could be present (hepato- and
omegaly, slight biochemical shifts).
cal observation of 116 children during 3
suffering formes frustes and anicteric
of the disease, showed that the residual
oms persisted in most patients up to 3-6 mo.;
me hepatomegaly was also preserved for a
r time. This indicates a need for a dis-
ry service for children enduring formes
es of the disease. Recurrences of formes
es and anicteric forms were found in 1.6-1.8%
ses and in typical forms in 3.3% of the
. A chronic course and formation of liver
osis was not observed in children enduring
s frustes and anicteric forms of this
se.

10792 DETECTION OF ANICTERIC FORMS OF EPIDEMIC HEPATITIS IN PEDIATRIC INSTITUTIONS OF NOGINSK. (Rus.) Khramova, L. P. (Noginsk City Hosp., USSR). Zh. Mikrobiol. 44(7):31-34, 1967.

In 1965 viral hepatitis, in 45% of those with hepatitis, developed for the first time actively; in 50.5% it was diagnosed as anicteric and formes frustes of the disease. The results of prophylactic measures among children used in foci of viral hepatitis (day nursery, kindergarten, school) showed that of 8710 children examined 91 (1.4%) were ill; 440 examined for aldolase and transaminase activity in the blood 85 (18%) were ill; of 8616 examined for presence of bile pigments in the urine 25 (0.3%) were ill; of 177 with grippe and catarrh of the upper respiratory tract 15 (8.4%) were ill; of 77 hospitalized in the diagnostic ward 51 (66.2%) were ill. Therefore, hospitalization of contacted persons with increased enzyme activity and appearance of catarrhal symptoms is necessary. Frequency of development of anicteric, formes frustes or jaundice form of epidemic hepatitis was in 1964, 1%, 9%, or 90%, resp., in 1965, 16%, 34%, or 50%, resp. Massive outbreaks in childrens institutions had some general patterns; they appeared if the first patient had pronounced catarrhal symptoms and prolonged (up to 2-3 wk.) prodromal period, a significant part of which elapsed in the institution; subsequent cases appeared as an outbreak of up to 5-6 cases and later as a chain lasting up to 1 mo. (incubation period 7-22 days); clinically the disease had anicteric and formes frustes in 50% of the cases. In all the children institutionalized up to fourth grade γ-globulin was used in the dose of 1.5 and 1.0 ml. Of 2573 contracted persons vaccinated by γ-globulin 117 (4.6%) became ill, while among nonvaccinated the resp. value was 99 of 1116 (8.9%). The poor effectiveness of γ-globulin is due to late vaccination (later than 5 days after contact) in 88% of the cases.

10793 CHANGES IN THE BLOOD SERUM LEVEL OF FREE AMINO ACIDS IN CHILDREN SUFFERING FROM EPIDEMIC HEPATITIS. (Rus.) Spektor, E. B. (Moscow Sci. Res. Inst. Child. Surg.). Vop. Okhr. Materin. Dets. 12(5):26-31, 1967.

Study of 16 patients with mild form (Group 1), 16 with moderately-severe form (Group 2) and 5 with severe form (Group 3) of infectious hepatitis showed changes in blood serum amino acid level in all; they were most pronounced in Group 3 as compared to 10 healthy children. Total amount of amino acids in Group 3 was increased in all patients; a significant increase was found in conc. of threonine, glutamic and aspartic acids, tyrosine, methionine, alanine, glycine and phenylalanine; a lower increase in conc. of glutamine and serine; a decrease in conc. of valine and leucine;

while the conc. of lysine, histidine, arginine, cystine and tryptophan were increased or decreased. In Group 2 an increase of glutamic acid was found in 10; threonine, aspartic acid, glycine, serine and phenylalanine content in 6; methionine content in 8; while the content of lysine, leucine and valine was somewhat decreased in 14. In Group 1 an increase, which was less pronounced than in Group 2, in the level of glutamic and aspartic acids, serine and glycine was found in 7, and that of methionine, threonine, and phenylalanine in only 2, while the lysine, valine, and leucine content were decreased. In Group 1 (6 patients) and Group 2 (4 patients) and in patients in the climax of the disease, the total amount of amino acids was significantly decreased due to a sharp decrease of conc. of serine, aspartic acid, histidine, arginine, threonine, alanine, glycine, lysine, valine, and leucine. In the majority of cases in Group 1-2 in the period of regression of symptoms and reconvalescence, faster positive dynamics were noted than in Group 3; however a complete normalization of amino acid composition was found at clinical cure in only 3 patients. In the remaining patients the composition was disturbed due to a conc. change of 2-3 amino acids, e.g., increase in conc. of alanine, glycine, serine, and aspartic acid, or decrease in conc. of lysine, valine and leucine. Almost all these patients showed residual symptoms of epidemic hepatitis (splenomegaly, increased bilirubin, and others). Results studied in 20 children showed a normalization of amino acid composition in 25% of the children; after 1 yr. half had an amino acid level not yet completely restored. Changes in free amino acid content in infectious hepatitis directly depends on the form and period of disease. The most pronounced shifts were found in patients with severe form at the climax of the disease; a certain parallelism was noted between the degree of the disturbance of the amino acid level and the degree of dysproteinemia; however, a complete correlation with clinical manifestations of disease, with bilirubin level and with serum enzyme activity was not found. A necessity for a carefully differentiated approach to an incorporation of protein hydrolyzates, amino acid mixtures, and single amino acids in the complex of therapeutic measures in infectious hepatitis is stressed. In all the periods of disease chromatographic analysis of amino acids in the blood could serve as an additional test for hepatic function.

10794 BEHAVIOR OF CEREBROSPINAL TRANSAMINASES IN THE COURSE OF NEUROLOGICAL FORMS OF VIRAL HEPATITIS IN INFANCY. (It.) Laterza, G. (Child. Hosp., Bari, Italy) and D. De Serio. Minerva Pediat. 19(19):949-951, 1967.

Transaminase activity was determined in the cerebrospinal fluid of 10 children (8 male and 2 female; age 1.5-13 yr.) with severe neurological manifestations in the course of viral hepatitis. In 7, the neurological symptoms (convulsions,
delirium, sleepiness, tremor, and others) were
present at the onset of the disease, while in
the other 3, they appeared during the final
stage of acute yellow atrophy. Transaminase
levels were determined according to the
Friedman-Haugen colorimetric method (modified)
in 0.2 ml samples of cerebrospinal fluid carefully obtained so as to exclude the presence o
blood. Other routine laboratory tests were als
conducted. Cerebrospinal levels of glutamic-oxalacetic and glutamic-pyruvic transaminase we
within normal limits (12-25 U and 6-18 U, resp
in 7 patients but markedly increased (60-125 U
and 48-65 U, resp.) in the other 3. On the ot
hand, SGOT and SGPT levels were greatly increased (220-900 U and 300-1000 U, resp.) in a
patients. No correlation was seen between ser
and cerebrospinal transaminase levels; in 2 of
patients with high cerebrospinal levels, serum
levels were even lower than those observed in
patients with normal cerebrospinal levels. Th
3 patients with high cerebrospinal levels show
signs of hemorrhagic diathesis and had patholo
gical hemocoagulation (Quick, prothrombin, Fac
VII, proaccelerin) tests; all 3 died from
hemorrhage. Results indicate that the transaminases present in the cerebrospinal fluid
originate endogenously from the CNS. In
patients with high cerebrospinal levels, neuro
logical symptoms may be considered secondary t
hemorrhagic lesions, whereas in patients with
normal cerebrospinal levels, neurological symp
toms are of an infectious nature or a result c
metabolic disturbances due to hepatic insufficiency.

10795 TREATMENT OF JUVENILE HEPATITIS BY PREDNISONE. (Cz.) Morávková, J. (Thomayer Hosp., Prague-Krc). Cesk. Pediat. 21(10):876-879, 1966.

Treatment by prednisone of children with infe
tious hepatitis is indicated in the following
cases; symptoms indicating that the CNS has b
affected, symptoms of chronic hepatitis or
cirrhosis, prolonged cholestasis, and prolong
aversion towards food with symptoms of depres
In 1962 13 of 683 were treated with predniso
(av. 423 mg during 23 days). The initial dai
dose was 40 mg admin. in 4 portions which was
then gradually decreased. After 3-9 days bil
rubin disappeared from the urine. The levels
of Na and K became normal and the number of W
was less than 10,000 after the end of treatme
Among the children treated with Prednisone on
1 relapse was observed. In 1963, 21 of 967
hospitalized children were treated with
Prednisone. The initial daily dose was reduc
to 20-30 mg (0.5 mg/kg wt.). Each receiving
av. 292 mg during the 18 days. Their conditi
improved rapidly and relapses were not observ
during this yr.

10796 EFFECTS OF PREDNISONE TREATMENT DUR
THE ACUTE PHASE OF VIRAL HEPATITIS

HE INCIDENCE OF POST-HEPATITIS LIVER DISEASES AT -3 YEARS AFTER THE DISEASE. (STATISTICAL VALUATION OF 187 CASES). (It.) Da Villa, G. U. Naples, Italy), F. Fiorentino and F. Piccinino. . *Mal. Infett.* 18(12):835-840, 1966.

mong 187 patients (110 male and 77 female; 4.75% between 2-14 yr. old and 65.25% between 4-60 yr. old) selected 1-3 yr. after an acute pisode of viral hepatitis, 80 had been treated ith prednisone (0.5 mg/kg/day p.o.) for 10 days nd 107 (controls) had been given routine treat- ent (liver extracts, vitamins). Patients were elected for study on the basis of their having een hospitalized within 10 days of the appear- nce of jaundice and their being followed up to ne time of cure. Patients were considered to ave post-hepatitis liver disease if 1-3 yr. fter an acute episode of viral hepatitis they nowed positive response to 3 of 6 routine liver unction tests with or without concomitant linical signs. The overall incidence of post- epatitis liver disease in all patients was).75%. The incidence of post-hepatitis liver isease was higher (23.4%) among patients not reated with prednisone than among those treated ith prednisone (13.7%). No significant differ- nce was observed between the incidence of post- epatitis liver disease in the 2-14 (30.3%) or 4-60 yr. old (20.3%) groups. No significant ifference was observed in the incidence of liver athology among males or females in the group ot treated with prednisone, while the prednisone- reated group showed a higher incidence of liver athology among males (18.9%) than among females 3.7%). No significant difference was noted in ne incidence of liver disease among patients reated with prednisone for short (10-20 days) or ong (20-40 days) periods, nor in those treated n the early (within 10 days after the appearance f jaundice) or late (more than 10 days after the ppearance of jaundice) phase of viral hepatitis.

)797 ACTUAL AND DISPUTABLE PROBLEMS OF CORTICOSTEROID THERAPY OF BOTKIN'S ISEASE. (Rus.) Geller, L. I. (Khabarovsk Med. nst., USSR), Z. P. Kozlova and T. P. Glinskaia. *rach. Delo* (4):112-113, 1967.

study was made on 130 persons who had viral epatitis (moderately-severe to severe forms) .5-4.0 yr. before observation (80 of the atients received prednisolone, usually a total f 250-300 mg in 2 wk.), and on 23 patients who ad the severe form of viral hepatitis during ne preceding yr. and received no corticosteroid nerapy. In patients with the severe form, nronic hepatitis developed somewhat more fre- uently than in patients with a moderately-severe orm. At the same level of severity of viral epatitis, the frequency of transition to chronic epatitis was similar in both prednisolone- reated and untreated patients; the difference as statistically insignificant. Also among nese 2 groups, there was no essential difference n the frequency of inflammatory processes in the bile tract in the remote period after viral hepatitis. In patients with viral hepatitis, the following were noted: a reduced partial acidity of the gastric juice, a tendency toward a hypokinetic form of the electrogastrogramm as an indicator of reduced motor function of the stomach, RBC macrocytosis, thrombocytopenia, decreased osmotic stability of WBC, and in some, a decrease of the functional reserves of the adrenal cortex as determined by excretion of 17-hydroxycorticosteroids in response to loading with ACTH. The frequency of all of these disturbances in patients enduring viral hepatitis was similar for both prednisolone-treated and untreated patients. Thus, corticosteroid therapy in viral hepatitis does not prevent the development of chronic hepatitis, and a number of functional disturbances of the stomach, adrenal cortex and blood parameters, at the same time, do not promote development of these pathologic changes in the remote period after viral hepatitis.

10798 HARMLESSNESS OF γ-GLOBULIN, PREPARED FROM SERUM MIXTURE, INCLUDING THE SERUM OF AN EPIDEMIC HEPATITIS PATIENT (ACCORDING TO THE DATA OF AN EPIDEMIOLOGICAL TRIAL). (Rus.) Stepanov, G. P. (Moscow Inst. Epidemiol. & Mikrobiol.), T. M. Khrometskaia, V. A. Kamenskii, T. P. Zinina, A. G. Balashova, E. S. Narolina, E. F. Kireeva and M. A. Vaistikh. *Zh. Mikrobiol.* 44(7):34-40, 1967.

In Voronezh in 1964-5, 5712 children (age 1-8 yr., Group 1) were vaccinated by experimental (hepatitic) and 5861 (age 1-8 yr.; Group 2) by control (normal) series of γ-globulin. The morbidity in Group 1 was 13 of 5712 (2.28%) or 2.28/1000 children and in Group 2, 17 of 5861 (2.90%) or 2.90/1000 children during a 1-yr. period. In both groups the morbidity was equal at the same period. Morbidity indices in Group 1 did not depend on the time of maintenance of γ-globulin nor on the degree of possible infectivity of the original mixture of sera. During the first 7 mo. of observation (June-December) morbidity among the children of both groups was the same. In Group 1 during the first 4 mo. of observation (optimal incubation period in serum hepatitis) not 1 child had hepatitis. The series of γ-globulins prepared from the mixture of sera from epidemic hepatitis patients proved to be harmless.

10799 REMOTE RESULTS OF MASS GAMMA-GLOBULIN VACCINATION AS A METHOD OF EPIDEMIC HEPATITIS PROPHYLAXIS. (Rus.) Spotarenko, S. S. (Cent. Inst. Epidem., Moscow). *Zh. Mikrobiol.* 44(4):58-62, 1967.

Randomly-selected kindergarten and school children from 342 children's institutions were divided into 3 groups; Group 1 (30,038 children) were mass inoc. with γ-globulin (1.5 ml); Group 2 (22,609) were inoc. with 3 ml following signs of epidemic; Group 3 (20,413) were used as controls. Mass prophylaxis of epidemic hepatitis by γ-globulin in the pre-epidemic period in the first yr. of observation was 1.9 times more effective than inoc. after appearance of the epidemic. In the second yr. the morbidity level in the group with earlier mass inoc. was 1.3 times higher than in the group inoc. after epidemic appearance. Morbidity/1000 children in 1963-1964 was as follows: Group 1 - 5, Group 2 9.6 and for Group 3, 14.5; in 1964-1965 it was, resp., 12.5, 9.6 and 12. The morbidity (according to mo.) was approx. the same in all groups. The number of cases (%) and focal coefficient were, in the first yr. as follows: Group 1, 5.5 and 2.44, resp., in Group 2, 64.9 and 2.86, resp., in Group 3, 62.7 and 4.6, resp. In the second yr. in Group 1 it was 74.7 and 4.3, resp., in Group 2, 69.1 and 3.1, resp., in Group 3, 73.5 and 3.8, resp.

10800 CYTOMEGALOVIRUS HEPATITIS IN THE ADULT. (E.) Toghill, P. J. (King's Coll. Hosp., London), M. E. Baily, R. Williams, R. Zeegen and R. Bown. Lancet 1(7504):1351-1354, 1967.

In 2 patients a cholestatic hepatitis was associated with high and protracted fever, atypical mononuclear cells in the blood, episodes of hemolysis and negative Paul-Bunnell reactions. In a 56-yr.-old man with acute myocardial infarction, at the peak of jaundice, serum-bilirubin increased to a peak of 10 mg/100 ml, SGOT to 480 U/ml (normal range, 5-30), alkaline phosphatase to 42 King-Armstrong U/ml, and serum-albumin decreased to 2.4 g/100 ml. This patient was treated with i.v. heparin and phenindione. Liver biopsy revealed features of an acute hepatitis, indistinguishable from viral or drug origin, and moderate cholestasis. Complement-fixing antibody titer for cytomegalovirus was 128 on both of 2 occasions; cytomegalovirus was isolated from the urine. In a 23-yr. old woman treated by open-heart surgery for closure of a ventricular septal defect, mild anorexia and a temperature spike to 104°F was accompanied by jaundice, serum total bilirubin of 16.4 mg/100 ml, SGOT of more than 400 U/ml (normal, 15-40), alkaline phosphatase of 81 King-Armstrong U and serum-B_{12} conc. of 730 pg/ml. Liver biopsy disclosed slight cholestasis and a picture of subacute hepatitis with fibrosis. Soon after onset of illness, cytomegalovirus complement-fixing antibody titer was less than 8, but 35 days later it had risen to 512; it was isolated from urine 48 days after start of the illness. It is suggested that in each of these 2 cases, cytomegalovirus infection was the cause of hepatitis, and that infection with cytomegalovirus may be a commoner cause of hepatitis than has previously been thought.

10801 ELECTRON MICROSCOPY OF THE HEPATOCELLULAR AND KUPFFER-CELL LESIONS OF MOUSE HEPATITIS, WITH PARTICULAR REFERENCE TO THE EFFECT OF CORTISONE. (E.) Ruebner, B. H. (Johns Hopkins U. Sch. Med., Baltimore, Md.), T. Hirano and R. J. Slusser. Amer. J. Path. 51(2):163-189, 1967.

Female pathogen-free CD I weanling mice received 0.1 ml of a virus suspension of the MHV_3 strain of mouse hepatitis; cortisone acetate was inj. s.c. once/day at a dose of 2.5 mg/animal. Cortisone not only increased the number and size of the necrotic foci produced by MHV_3 virus but also altered the histologic appearance of the necrotic parenchymal cells when observed under light microscopy. Instead of becoming uniformly hyalinized, hepatocytes became markedly swollen and subsequently underwent a lytic type of necrosis. Cytoplasmic virus formation was seen most clearly in hepatocytes of cortisone-treated mice. Particles appeared to form in relation to newly synthesized cytoplasmic aggregations of ribosome-like particles and acquired an outer envelope by budding through smooth membranes that were probably derived from proliferated endoplasmic reticulum. Hyalinization seemed to correspond to 2 ultrastructural lesions. One of these was the development in hepatocytes of dense, often focal, cytoplasmic degradation with loss of ribosomes and membrane proliferation. Less commonly there was proliferation of smooth endoplasmic reticulum. Both of these alterations were occasionally observed in Kupffer cells. Lytic necrosis in hepatocytes of cortisone-treated animals corresponded to marked intracellular edema, striking mitochondrial swelling with calcification of the cristae, and the formation of intracellular vacuoles possibly derived from focally dilated endoplasmic reticulum or pale cytolysomes. Irrespective of cortisone admin., necrosis in the Kupffer cell was usually of the lytic variety.

10802 EXPERIMENTAL VIRAL HEPATITIS IN THE DOG: PRODUCTION OF PERSISTENT DISEASE IN PARTIALLY IMMUNE ANIMALS. (E.) Gocke, D. J. (Columbia U. Coll. Physicians & Surgeons, New York, N. Y.), R. Preisig, T. Q. Morris, D. G. McKay and S. E. Bradley. J. Clin. Invest. 46(9):1506-1517, 1967.

Experimental infection with canine hepatitis virus was studied in 49 dogs. The pattern of response to infection was distinctly modified by the immune status of the animal; all of 19 fully susceptible dogs had an acute, fulminating fatal hepatitis when infected with a standard dose of virus, and all of 19 dogs with high levels of immunity to the virus survived without apparent illness. Eleven dogs were spontaneousl encountered with partial immunity to the infectious agent; these animals developed different, prolonged forms of hepatitis after infection. In 4 animals death occurred in 8-21 days after what was termed a subacute course; the remaining 7 dogs survived up to 8 mo. with evidence of chronic liver damage. The chronic and subacute forms of hepatitis were reproduced

perimentally in 7 of 8 fully susceptible dogs
at were passively immunized against the canine
patitis virus by admin. of hyperimmune serum.
though the virus could be found in sites of
patic damage in the early stages of the sub-
ute and chronic diseases, it could not be
monstrated in the later stages which were
aracterized by persistent liver damage and a
rked chronic inflammatory reaction. Dogs with
ronic hepatitis eventually developed extensive
patic fibrosis.

803 INDUCTION OF TUMOURS IN HAMSTERS WITH
INFECTIOUS CANINE HEPATITIS VIRUS.
.) Sarma, P. S. (Microbiol. Assoc., Bethesda,
.), W. Vass, R. J. Huebner, H. Igel, W. T. Lane
d H. C. Turner. Nature (London) 215(5098):
3-294, 1967.

derle Strain 255 of infectious canine hepatitis
s used in these studies. A virus preparation
issue culture inhibitory dose$_{50}$, titer 107/ml)
s made by a single passage in canine kidney
lls and inoculated into 14 (3 litters) newborn
msters; each hamster was inoculated with 0.1
/site by i.p. and s.c. routes. Two of the 14
oculated hamsters developed 10-20 mm tumors at
e site of inoculation, the first appearing on
y 360 as a s.c. tumor and the second as an i.p.
mor on day 403. When they had reached a size
30 mm, the tumors were surgically removed,
nced to small pieces and transplanted s.c. into
wborn as well as weanling hamsters, most of
ich developed tumors. The serial s.c. trans-
ants of the i.p. tumor grew rapidly in newborn
msters and reached sizes of 40-60 mm within
6 wk.; growth of transplants in weanling ham-
ers was less rapid and some of the inoculated
msters failed to develop tumors. The primary
ral-induced s.c. tumor was a low-grade fibro-
rcoma that manifested its morphological
aracteristics on transplantation in hamsters;
e primary i.p. tumor was an undifferentiated
oplasm. Hamsters developing large transplanted
p. line tumors which survived beyond the fifth
. usually developed complement-fixing serum
tibodies that reacted with the homologous tumor
tigen and with T antigens of strain 255 and
eybridge' strain of infectious canine hepatitis
rus prepared from infected canine kidney and
rret lung cultures. Such complement-fixing
tigens and antibodies were not detected in
msters bearing the primary tumor or secondary
ansplants of the primary s.c. tumor. The
activity of the antigen and antibody described
peared to be specific for infectious canine
patitis hamster tumor system and infectious-
nine-hepatitis-virus-infected cultures.

804 EVALUATION OF HEPATITIS AS AN
OCCUPATIONAL DISEASE. (Ger.) Deglmann,
Med. Welt. 18(32):1868-1871, 1967.

05 CORRELATION BETWEEN THE CHOLESTEROL,
BETA-LIPOPROTEIN AND QUICK'S PROTHROMBIN TIME IN VIRUS HEPATITIS IN CHILDREN. (Pol.) Franczak, T. (Municipal Hosp., Lublin, Poland), M. Kedracki and S. Panas. Pol. Tyg. Lek. 22(13):459-461, 1967.

10806 SERUM PHOSPHOLIPID LEVELS IN PATIENTS WITH VIRAL HEPATITIS. (Pol.) Sawaryn, T. (Infect. Dis. Clin., Bytom, Poland). Pol. Tyg. Lek. 22(3):87-89, 1967.

10807 DETERMINATION OF CHOLINESTERASE IN OBSTRUCTIVE JAUNDICE AND IN THE COURSE OF VIRUS HEPATITIS. (Pol.) Kroll, J. (1st Surg. Clin., Poznan, Poland), K. Wolko, C. Sarrazin, J. Gutowski, R. Krzywiński and J. Hryniewiecki. Pol. Tyg. Lek. 22(28):1068-1070, 1967.

10808 ARTICULAR MANIFESTATIONS OF INFECTIOUS HEPATITIS. (E.) Gue, T. B. (Med. Coll. South Carolina, Charleston) and W. M. Bonner, Jr. J. S. Carolina Med. Ass. 63(8): 279-281, 1967.

10809 HEPATIC RHEOGRAPHY IN VIRAL HEPATITIS. (It.) Furno, F. (Biella Hosp., Italy) and A. Guala. Minerva Med. 58(55):2521-2525, 1967.

10810 PRIMARY CHOLEDOCHITIS AS A COMPLICATION OF INFECTIOUS HEPATITIS. (Pol.) Tkacz, B. (Infect. Dis. Clin., Lodz, Poland) and J. Fabianowski. Przegl. Lek. 23(4):378-380, 1967.

10811 SPLENOGRAM IN ACUTE VIRAL HEPATITIS. (Ger.) Iványi, J. (Community Hosp., Gyula, Hungary) and M. Pintér. Acta Hepatosplen. (Stuttgart) 14(4):237-241, 1967.

10812 STUDIES ON THE ETIOLOGY OF VIRAL HEPATITIS (VH). I. ATTEMPTS AT ISOLATION OF THE ETIOLOGIC AGENT BY VARIOUS METHODS. (E.) Georgiades, J. (Cracow Med. Inst., Poland), I. Zgórniak-Nowosielska, M. Zembala and S. Obal. Acta Med. Pol. 8(1): 63-78, 1967.

10813 STUDIES ON THE ETIOLOGY OF VIRAL HEPATITIS. II. MEDIA STIMULATING GROWTH OF VIRUSES. (E.) Georgiades, J. (Cracow Med. Inst., Poland), M. Zembala and I. Zgórniak-Nowosielska. Acta Med. Pol. 8(1):79-88, 1967.

10814 STUDIES ON UNSPECIFIC RESISTANCE MECHANISMS IN THE COURSE OF HEPATITIS EPIDEMICA. I. THE LEVEL OF ISOAGGLUTININS IN SERA OF VIRAL HEPATITIS PATIENTS. (E.)

Zgórniak-Nowosielska, I., J. Georgiades and S. Obal. Acta Med. Pol. 8(2):239-245, 1967.

10815 ANTISTREPTOLYSIN O TITER DURING INFECTIOUS HEPATITIS IN CHILDREN. (Fr.) Vanista, J. (Charles U., Prague) and J. Lasovska. Pediatrie 22(4):407-409, 1967.

10816 COURSE OF VIRAL HEPATITIS. (Por.) Vasconcellos, D. (Inst. Gastroent., Recife, Brazil), F. L. Castro and F. M. Reis. Arq. Gastroent. (Sao Paulo) 4(2):111-119, 1967.

10817 VIRUS HEPATITIS. (Dut.) Brandt, K. H. Leiden, Stafleu & Son, 1965, 74pp., $2.75.

10818 INFECTIOUS HEPATITIS; EPIDEMIOLOGY AND PREVENTION. (Rus.) Bezdenezhnykh, I. S. Moscow, 1966, 47pp., 25 cents.

10819 INFECTIOUS HEPATITIS. (Rus.) Birkovskii, Iu. E. (Ed.) Kiev, Zdorov'ia, 1966, 224pp., $1.50.

10820 PROBLEMS, DIAGNOSIS AND TREATMENT OF EPIDEMIC VIRAL HEPATITIS CONTRACTED DURING PREGNANCY. (Fr.) Turco, I., V. Dragomir, G. Dobrescu and M. Schonbak. Maroc Med. 47(504): 499-504, 1967.

10821 PREGNANCY AND INFECTIOUS HEPATITIS. (Rus.) Zhendrinskii, I. P. Moscow, 1966, 49pp., 25 cents.

10822 PARENTERAL TREATMENT OF ACUTE VIRAL HEPATITIS. (Sp.) Heilmeyer, L. (Med. U. Clin., Freiburg/Br., Germany), K. Beck and H. D. Kasemir. Prensa Med. Argent. 53(1-8): 499-503, 1966.

10823 MODERN METHODS OF TREATMENT OF VIRAL HEPATITIS. (Rus.) Aleksandrova, V. R Moscow, Meditsina, 1967, 229pp., $1.00.

10824 SOME DATA ON THE USE FOR MANY YEARS OF GAMMA GLOBULIN FOR PROPHYLAXIS OF INFECTIOUS HEPATITIS IN MOLDAVIAN SSR. (Rus.) Shliakhov, E. N., I. P. Bondurianskii, G. M. Groisman, Ia. G. Grozman and A. E. Kozhukhar. Rev. Roum. Inframicrobiol. 4(1):89-93, 1967.

10825 EXPERIMENTAL INFECTIOUS CANINE HEPATITIS. V. THE EFFECT OF RETICULO-ENDOTHELIAL BLOCKADE. (E.) Wright, N. G. (U. Glasgow, Scotland). J. Comp. Path. 77(3): 331-337, 1967.

10826 EXPERIMENTAL VIRAL HEPATITIS. (It.) Piazza, M. Turin, Minerva Medica, 1965, 236pp., $10.50.

827 PERITONEAL ATRIAL SHUNT FOR INTRACTABLE ASCITES. (E.) Hyde, G. L. (U. Ken-
ucky Coll. Med., Lexington) and B. Eiseman.
ch. Surg. (Chicago) 95(3):369-373, 1967.

implantable device consisting of an intra-
eritoneal sump, 1-way valves, a manually com-
ressible Holter pump and indwelling i.v. tubing
eading into the right atrium was used in 8
atients (49-77 yr. old; 7 with nutritional
irrhosis and 1 with postnecrotic cirrhosis; 1
lso had hepatocellular carcinoma) for relief of
ntractable ascites. Severity of the liver
isease was reflected by serum albumin conc. of
ess than 2.5 mg/100 ml in all patients; 5 were
linically jaundiced and all but 1 had a blood
rea N conc. of more than 30 mg/100 ml. One
atient is alive and ascites-free at the time of
eport with a functioning shunt 2.5 yr. after
peration; 4 died of liver disease 2-5 mo.
stoperatively; 1 died in heart failure with no
vidence of congestive failure in the immediate
ost-shunt period. Two patients died of com-
lications of the shunt operation; in every
atient, the shunt was patent at the time of
eath. On 4 occasions in 2 patients it was
ecessary to reoperate to clear the system of
ccluding fibrin clots. Although the device is
ot totally perfected, it is concluded that it is
worthwhile mechanical adjunct for the control
f ascites.

828 EMERGENCY PORTACAVAL SHUNT: A COMPARATIVE STUDY OF SHUNT, VARIX LIGATION AND
NSURGICAL TREATMENT OF BLEEDING ESOPHAGEAL
ARICES IN UNSELECTED PATIENTS WITH CIRRHOSIS.
E.) Orloff, M. J. (Harbor Gen. Hosp., Torrance,
alif.). Ann. Surg. 166(3):456-478, 1967.

prospective study of emergency treatment of
leeding esophageal varices in unselected patients
ith cirrhosis was conducted; 40 unselected,
dult patients (28 men, 12 women; 38 Caucasians,
Negroes; 33-65 yr. old, with a mean age of 49
r.) with moderate-to-advanced alcoholic cirrhosis
nd bleeding varices were subjected to an emer-
ency portacaval shunt within 8 hr. of admission
o the hospital; 58% had clinical jaundice, 43%
ad ascites and 20% had encephalopathy at time
f admission. Almost all patients had severe
epatic dysfunction and hypokalemic alkalosis
as present in 50% of the subjects in whom blood
ases and pH were measured. I.v. posterior
ituitary extract temporarily controlled bleeding
reoperatively in 88% of the group. Every
atient had portal hypertension; 15 had an end-
o-side portacaval anastomosis and 25 had a side-
o-side shunt, both of which reduced the portal
ressure markedly and controlled the bleeding in
very case. Postoperatively, 58% developed
epatic coma, 45% had delerium tremens, 20%
eveloped a peptic ulcer and 83% had alkalosis.
wenty-one of the 40 patients recovered from
peration, an early survival rate of 53%; 75% of the postoperative deaths were due to hepatic failure. With the exception of 1 patient who was followed for slightly less than a yr., survivors were followed for from 13-50 mo; 17 were still alive at time of report and the predicted 4-yr. survival rate calculated by the life-table method was 43%. Liver function improved significantly in 73% of the survivors and most have had active and useful lives. Two-thirds of the survivors have abstained from alcohol. Analysis of potentially preoperative and operative factors showed that only the presence of unstable ascites and of hypokalemic alkalosis affected the outcome. Survival of significant numbers of patients with 1 or another of the serious manifestations of cirrhosis suggested that, except for obviously decompensated cirrhosis with concurrent jaundice, ascites and encephalopathy, there are no clear contraindications to operation. Results of emergency portacaval shunt were compared with those obtained in previous prospective studies of medical treatment and of varix ligation. In comparable patients, both forms of operative therapy produced an early survival rate which was 3 times greater than that resulting from medical management. The 4-yr. survival rate after emergency shunt was significantly greater than the survival rate with the other types of treatment. The findings of this study suggest that early and definitive operative control of varix hemorrhage provides the cirrhotic patient with the greatest chance of surviving. Although studies involving larger numbers of patients are clearly necessary, it is suggested that the emergency portacaval shunt is the therapy of choice for most cirrhotic patients who bleed from esophageal varices.

10829 PLASMA VOLUME IN CIRRHOSIS OF THE LIVER: ITS RELATION TO PORTAL HYPERTENSION, ASCITES AND RENAL FAILURE. (E.) Lieberman, F. L. (John Wesley County Hosp., Los Angeles, Calif.) and T. B. Reynolds. J. Clin. Invest. 46(8):1297-1308, 1967.

Plasma vol. was measured by using albumin-^{131}I- and ^{51}Cr-labeled RBC in 24 control subjects (16 men, 8 women), 140 patients with hepatic cirrhosis, and 10 patients (6 men, 4 women) with no cirrhosis but a variety of portal-systemic shunts for relief of portal hypertension; 63 (44 men, 19 women) had cirrhosis and no ascites, 34 (22 men, 12 women) had cirrhosis with ascites; 48 (33 men, 15 women) had cirrhosis and end-to-side or side-to-side portacaval anastomosis for relief of portal hypertension; 15 (13 men, 2 women) had cirrhosis and ascites complicated by functional renal failure. Almost all the patients with cirrhosis had a history of chronic alcoholism. Elevated values for plasma vol., by both methods, were found in each group of patients (aside from controls). The lymph space drained by the thoracic duct was measured by a radioisotopic technic in 6 patients with cirrhosis and ascites; the amount of radioactivity in this space was negligible in accounting for the elevated plasma vol. Similar results were obtained when the degree of leakage of albumin-^{131}I into the ascites was determined in 10 patients with cirrhosis. Plasma vol. was unusually elevated in patients who had bled from esophageal varices, and paired comparisons before and after portacaval shunt normal values; there was a statistically significant correlation between normal values. A statistically significant correlation was also found between plasma vol. and wedged hepatic venous pressure measured in 36 patients. It is concluded that the elevated values for plasma vol. in cirrhosis are valid and are not artifacts due to leakage of albumin-^{131}I from the circulation during mixing; it is also concluded that portal hypertension is responsible for expansion of the plasma vol. However, the authors, on this basis, were unable to explain the failure of portacaval shunting to return the plasma vol. to normal, unless the shunt or some other factor kept the plasma vol. elevated.

10830 PORTAL HYPERTENSION IN CHRONIC HEPATITIS AND LIVER CIRRHOSIS. LAPAROSCOPIC AND SPLENOPORTOGRAPHIC OBSERVATIONS. (Rus.) Loginov, A. S. (Ther. Inst., Moscow), G. S. Magnitskii and L. S. Matveeva. Ter. Arkh. 39(3): 29-37, 1967.

In 10 patients (21-57 yr. old) with chronic hepatitis, laparoscopy revealed enlarged liver, thickening of capsule, and sometimes perihepatitis; intrasplenic pressure (in mm H_2O) ranged from 100-250. Moderate dilatation of the vessels of the stomach, omentum, and parietal peritoneum was found in 3 by laparoscopy, and slight dilatation by splenoportogram of splenic and portal vein in 4. Architectonics of intrahepatic ramifications of portal vein was normal. In 24 patients (age 30-62 yr.) with postnecrotic liver cirrhosis of 6 mo-15 yr. duration showed liver deformation of various degrees. Clinicoroentgenologic signs of portal hypertension were found in only 15 patients; however, all showed increased (240-560) intrasplenic pressure. Splenoportograms showed dilatation and twisting of splenic vein, dilatation of portal vein and formation of collateral tract outflow; laparoscopy revealed dilatation and twisting of small ramifications of portal vein, and dilatation of veins of ligamentum teres hepatitis, of parietal and visceral peritoneum, of omentum, stomach and diaphragm. In many patients architectonics of the liver portal bed was changed; e.g., vascular picture was impoverished and deformed. In 6 of 24 splenoportograms, partial or complete obstruction of splenoportal stem, conditioned mostly by thrombosis was observed. In 14 patients (36-72 yr.) with portal liver cirrhosis of 1-12 yr. duration morphologic hepatic changes were characterized by micronodular type of regeneration. Intrasplenic pressure was increased (330-517); splenoportograms showed dilated splenic vein in 4 and dilated portal vein in 5; portacaval collaterals were found in 4. Laparoscopy revealed dilated and twisted veins of omentum, stomach, hepatic capsule, gallbladder, parietal and visceral peritoneum, ligamentum teres hepati and diaphragm. Architectonics of intrahepatic ramifications of portal vein was similar as in the patients with postnecrotic cirrhosis. In 7 (33-49 yr.) with primary (5) or secondary (2) biliary liver cirrhosis of 1-8 yr. duration morphological characteristics were close to thos in portal cirrhosis except it proceeds with intr hepatic cholestasis. Portal hypertension could be determined only by instrumental methods. Intrasplenic pressure was increased (230-427) in all. Some dilatation of the splenic and portal vein was found in only 1; portal vein obstructio in 1; collateral blood circulation in 4; and ascites in 1. The intrahepatic picture of porta vein ramifications had no specific characteristi

10831 THYROXINE TURNOVER AND TRANSPORT IN LAENNEC'S CIRRHOSIS OF THE LIVER. (E. Inada, M. (Bronx VA Hosp., N. Y.) and K. Sterlin J. Clin. Invest. 46(8):1275-1282, 1967.

Studies of the metabolism of thyroxine in 14 men with cirrhosis of the liver associated with alcoholism showed a variety of deviations from normal. In addition to radiothyroxine turnover studies, determinations were made of the free thyroxine fractions and free thyroxine I conc. in serum (Mg precipitation method) as well as th max. binding capacities of thyroxine-binding α-globulin and thyroxine-binding prealbumin by reverse flow paper electrophoresis in a glycine acetate system at pH 8.6. All cases of cirrhosi showed diminutions in thyroxine-binding prealbumin capacities but their thyroxine-binding α-globulin capacities showed a wide scatter (13.4-41.6 μg/100 ml). The free thyroxine fraction was quite variable, with distinct elevation in 9 of 17 sera. The binding proteins appeared to be determinants of the free thyroxine fraction, which in turn appeared to be a direct determinant of the half-time of turnover; these inferences did not exclude other possible factors, including diminished hepatic uptake and metabolism of the hormone in liver disease. In spite of considerable alterations in biological half-times, free thyroxine values and binding proteins, it was remarkable that the absolute hormone disposal was normal in all 14 patients with cirrhosis of the liver.

10832 LUPOID CIRRHOSIS WITH SERUM LACTIC ACID DEHYDROGENASE LINKED TO AN γ A IMMUNOGLOBULIN. (E.) Ganrot, P. O. (Malmo Gen. Hosp., Sweden). Experientia 23(7):593, 1967.

Under agarose gel electrophoresis, serum from a patient with lupoid cirrhosis with jaundice showed an abnormal mobility and increased width of the zones of all the isoenzyme fractions of LDH; this was interpreted as evidence of LDH-isoenzymes being bound to some serum protein

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th a low charge. The serum was fractionated by l filtration in a Sephadex G 200 column; distribution of the activity among the fractions sembled that of a homogenous protein fraction uted from the column somewhat before γG, whereas H is normally eluted after γG. Paper electrooresis of the serum showed a low albumin conc. .1 g/100 ml), and a massive polyclonal increase γ-globulin (2.5 g/100 ml); immunochemical alysis showed the serum conc. of γG, γA and γM be 195, 220, and 250%, resp., of normal. LDH-actions sid not migrate in specific antihuman , but did so in anti-γG and anti-γM; none of ese antisera affected the mobility of normal H-isoenzymes. Equal vol. of lupoid serum and rum from another patient with myocardial inrction were mixed; no LDH-fraction with normal bility could be demonstrated in the mixture; is showed that a considerable amount of free H-binding protein occurred in serum, and also at normal LDH could be bound. From this it was sumed that the patient's own LDH was also norl and that the abnormal LDH pattern was due to e presence of an abnormal γA fraction. The ta indicated very high specificity and strong teraction between an γA-fraction and LDH. The mplex LDH-γA was not dissociated on gel filtraon in neutral pH, and it is therefore probable at the complex occurred *in vivo* in the patient's n blood.

833 URINARY ALDOSTERONE CONTENT IN PATIENTS WITH LIVER CIRRHOSIS. (Rus.)
etagurova, A. N. (Leningrad Sanitary-Hygiene d. Inst., USSR). *Vrach. Delo* (4):18-20, 1967.

a study on 20 patients (18 males, 2 females; -54 yr. old) with liver cirrhosis of 4 mo.-23 . duration, it was found that aldosteronism veloped in the period of active progression; is was conditioned by the inability of the liver inactivate aldosterone. All of the patients re divided into 3 groups according to the stage the disease: 1) the initial stage; 2) stage formed cirrhosis; and 3) dystrophic stage dvanced); the patients were also subdivided cording to the degree of portal hypertension to 4 stages: I. determined only by instrumental thods; IIA-clinical dyspepsia, splenomegaly tages I and IIA were found in 9 patients); IIB-cites, venous collaterals, varicose dilatation the esophageal veins (found in 10); III-mpensated by surgery (found in 1 patient). The ysiological fluctuation of aldosterone in the ily urine was 1-10 μg (av. 6.8 μg). In 2 tients of the first group with portal hyper-ension I-IIA and the inactive phase aldosterone nc. was 10.3 and 12.0 μg, resp. In patients Group 2 with portal hypertension I-IIA and active phase, aldosterone excretion was 12.7 d 15.0 μg, and in the active phase in 4 tients, it varied from 20.4-44.3 μg (av. 33.3); in 5 other patients with IIB portal hyper-ension and active phase, aldosterone secretion ried from 29.9-75.0 μg (av. 50.2 μg), and in 1 tient in the inactive phase, it was 15.3 μg. In 1 patient of Group 3 with I-IIA portal hypertension and inactive phase, aldosterone content in the urine was 16.1 μg, and in 4 patients with IIB portal hypertension and active phase, it ranged from 34.3-3-72.0 μg (av. 45.3 μg). Thus, the level of aldosterone excretion depended very little on the degree of portal hypertension. Biochemical indices of liver function revealed a significant disturbance in liver function during the active phase which concurred with the increase in aldosterone excretion in the urine. In the dystrophic phase of liver cirrhosis with pronounced liver insufficiency, the excretion of aldosterone in the urine was low; this was caused by reduction of secretion of mineralocorticoids by the adrenal cortex.

10834 COMPARISON OF ORAL ISOSORBIDE AND INTRAVENOUS MANNITOL AS ADJUNCTS TO THE DIURESIS OF PATIENTS WITH CIRRHOSIS OF THE LIVER. (E.) Gagnon, O. (Duke U. Sch. Med., Durham, N. C.), P. M. Gertman and F. L. Iber. *Amer. J. Med. Sci.* 254(3):284-295, 1967.

P.o. isosorbide and i.v. mannitol were compared for their effects on water, Na and K excretion in patients (21; 14 men, 7 women; 21-63 yr. old, with a mean age of 48) with cirrhosis of the liver and chronic or refractory fluid retention. The highest pretreatment urinary excretion of Na ranged from 1.0-140 mEq/day, with a mean of 33; that of K ranged from 28-117 mEq/day, with a mean of 50.7; and the mo. of duration of fluid retention ranged from 0.5-72, with a mean of 13.8 mo. Both isosorbide and mannitol produced water diuresis but did not produce significant Na and K losses when admin. alone. Both agents potentiated the Na excretion associated with spironolactone and hydrochlorothiazide. In patients excreting less than 6 mEq/day of Na, isosorbide produced significant Na excretion. P.o. isosorbide was studied for gastrointestinal, bone marrow, hepatic and renal toxicity; no significant adverse reaction was encountered in either the tests or clinical observations. P.o. isosorbide was of approx. the same effectiveness as i.v. mannitol and more convenient to admin.

10835 EFFECTS OF CHANGING PLASMA VOLUME, SERUM ALBUMIN CONCENTRATION, AND PLASMA OSMOLALITY ON RENAL FUNCTION IN CIRRHOSIS. (E.) McCloy, R. M. (Mayo Clin., Rochester, Minn.), W. P. Baldus, F. T. Maher and W. H. J. Summerskill. *Gastroenterology* 53(2):229-239, 1967.

Renal clearances of inulin and p-amino-hippuric acid, as well as of endogenous substances, were determined before and after single i.v. infusions of human serum albumin or hypertonic NaCl soln. in 22 patients (14 men, 8 women; 37-75 yr. old) with cirrhosis. Cirrhosis was associated with alcoholism in 13, and was of uncertain etiology in 9. Most of the patients had ascites and hypoalbuminemia; none had evidence of primary renal disease, but 7 had elevated blood urea conc. due to spontaneous impairment of renal function associated with liver failure. Single infusions of 50 g of albumin produced plasma vol. expansion and a mean increase in effective renal plasma flow (p-amino-hippuric acid clearance), but not in glomerular filtration rate (inulin clearance). No correlation existed between changes in plasma vol. and effective renal plasma flow; increases in effective renal plasma flow were limited to those patients with normal or only modestly impaired renal function, whereas those with the poorest renal function did not respond. After repeated albumin infusions, neither effective renal plasma flow nor glomerular filtration rate was altered despite maintenance of plasma vol. expansions and a significant rise in serum albumin conc. Hypertonic NaCl infusions produced an increase in plasma osmolality, but did not affect glomerular filtration rate or effective renal plasma flow. Urinary excretion of water and electrolytes was not significantly altered by infusions of either albumin or saline. These findings indicate that infusions of albumin or hypertonic NaCl are unlikely to be beneficial in the treatment of renal circulatory failure in cirrhosis, since neither substance produced improvement in patients with more severely impaired renal function.

10836 RENAL CONCENTRATING ABILITY IN CIRRHOSIS. I. CHANGES ASSOCIATED WITH THE CLINICAL STATUS AND COURSE OF THE DISEASE. (E.) Vaamonde, C. A. (U. New Mexico Sch. Med., Albuquerque), L. S. Vaamonde, H. J. Morosi, E. L. Klingler, Jr. and S. Papper. J. Lab. Clin. Med. 70(2):179-194, 1967.

Conc. ability was studied in patients with cirrhosis of the liver (9 men, 2 women; 28-64 yr. old; 10 with Laennec's cirrhosis and 1 with postnecrotic cirrhosis) at different stages of the disease and in chronically ill noncirrhotic control patients (9 men; 41-60 yr. old; these had such diseases as chronic pulmonary disease, multiple sclerosis, rheumatoid arthritis, chronic recurrent duodenal ulcer and postgastrectomy syndrome) under controlled dietary conditions. A significant reduction in max. urine conc. and in the rate of solute-free water reabsorption was found in the patients with cirrhosis. The noncirrhotic control patients had a normal conc. ability. The mechanism of the impaired conc. ability in cirrhosis was not clear. The data suggest that a decreasing delivery of Na to the distal site did not satisfactorily explain the conc. defect. However, because of the indirect methodology employed, it was difficult to formulate definite conclusions or to exclude some of the other alternative mechanisms which were suspected. Results obtained during the compensated and decompensated stages of the disease indicated that a relationship exists between the clinical status and course of the disease and the conc. ability of patients with cirrhosis. Whatever may be the mechanism of the impaired conc. ability in cirrhosis, it is reversible.

10837 INTRAVENOUS THERAPY OF MASSIVE ASCITES IN PATIENTS WITH CIRRHOSIS. I. SHORT TERM COMPARISON WITH DIURETIC TREATMENT. (E.) Vlahcevic, Z. R. (Lemuel Shattuck Hosp., Boston, Mass.), N. F. Adham, T. C. Chalmers, R. J. Clermont, E. W. Moore, H. Jick, G. W. Curtis and R. S. Morrison. Gastroenterology 53(2):211-219, 1967.

In a 2-part study, the effect of i.v. and diuret therapies, alone or in combination, on massive ascites, was studied in 18 patients with Laennec' cirrhosis. In Part 1, the 18 patients were divided into 3 groups: A) 6 patients who received autogenous i.v. ascitic fluid removed by paracentesis (4000 ml); B) 6 patients who received NaCl and albumin i.v. in amounts equivalent to that in the discarded ascitic fluid (4000 ml); and C) 6 patients received combinatio of potent diuretic drugs: 5 received varying conc. of hydrochlorothiazide (200 mg); prednisone (30 mg) and triamterene (200 mg) in planned sequences; and 1 received the bombination mercuhydrin (2 ml), spironolactone A (100 mg) and triamterene (200 mg), also in planned sequences. In Part 2 of the study, 3 different 1-day treatments were admin. at random as follows Treatment 1, diuretic therapy (mercuhydrin, 2 ml, or hydrochlorothiazide, 200 mg, and spironolactone A, 100 mg); Treatment 2, i.v. saline and albumin in amounts equivalent to discarded ascitic fluid, and no diuretics were given; and Treatment 3, a combination of the first 2 treatments, the diuretic being admin. so that its peak effect coincided with the i.v. therapy: mercuhydrin was admin. 1 hr. before i.v. infusion, and the combination of hydrochlorothiazide (200 mg) and spironolactone A (100 mg) was admin. p.o. as 1 dose 3 hr. before i.v. therapy. The i.v. infusion of ascitic fluid or albumin and saline during and after paracentesis resulted in moderate diuresis and natriuresis similar to that produced by diuretic therapy alone; there was no significant difference between ascites reinfusion and albumin-saline replacement of discarded ascitic fluid. Diuresis resulting from i.v. therapy appeared to be related to the expansion of effective circulating blood vol. with a subsequent rise in glomerular filtration rate, suppression of antidiuretic hormone activity and increase in free water clearance. Combination of diuretics with i.v. replacement therapy during paracentesis resulted in marked diuresis and natriuresis, and appeared to be an effective and relatively safe way of treating resistant ascites, particularly in patients with hyponatremia, defective renal function and azotemia.

10838 INTRAVENOUS THERAPY OF MASSIVE ASCITES IN PATIENTS WITH CIRRHOSIS. II. LONG TERM EFFECTS ON SURVIVAL AND FREQUENCY OF RENAL FAILURE. (E.) Clermont, R. J. (Lemuel Shattuck Hosp., Boston, Mass.), Z. R. Vlahcevic, T. C. Chalmers, N. F. Adham, G. W. Curtis and R. S. Morrison. Gastroenterology 53(2):220-228, 1967.

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y patients with cirrhosis and severe ascites
stratified into 3 groups according to the
ity of their liver diseases and ascites:
1, patients with severe ascites but no
aindication to diuretics; Group 2, patients
the same degree of ascites and 1 or more
aindications to diuretics; and Group 3,
nts similar to those of Group 2, but whose
output was definitely less than 500 ml/day.
nts were then randomly assigned to 1 of the
lowing modes of treatment: 1) conventional
py: conventional management of patients
cirrhosis and ascites according to their
ical status; included use of diuretics, but
never received i.v. therapy, except for
tment of hemorrhage; and Group 2, i.v.
py: no diuretics; abdominal paracentesis
reinfusion of ascitic fluid, or use of an
valent amount of 0.85% saline and 1-2%
min soln. The length of hospitalization after
mization was essentially the same for
entionally-treated and re-infused patients
in each group. In Group 1, ascites disappeared
r an av. of 8 wk. in patients conventionally-
ted and after 9 wk. in re-infused patients;
pheral edema regressed in 5 wk. among the
er and in 7 wk. among the latter. Patients
roup 1 showed a significant decrease of body
with time, but there was no treatment
erence; those in Group 2 failed to show a
ificant decrease in body wt. The occurrence
astrointestinal hemorrhage, expressed as the
er of bleeding episodes during the 10-wk.
od of observation, was essentially the same
each type of therapy, either within each
p or combining all groups. A significant
increase in blood urea nitrogen was found
roup 1 patients with no significant differ-
s between treatments; there was a tendency
rd a greater rise in the conventionally-
ted group. There were no significant changes
erum Na or albumin in Groups 1 and 2; serum
id increase significantly in i.v.-treated
p 3 patients. Survival of patients was
6 mo.) 84±5.1% for Group 1, 33±11.1% for
p 2 and 0% for Group 3, indicating a statisti-
y significant difference between groups. In
p 1, 56% of the patients were alive 36 mo.
r randomization, whereas 50% survival was 7
and 2.5 wk. for Groups 2 and 3, resp. The 2
erent treatments had no demonstrable influence
urvival. Four major complications contribut-
to death included renal failure, hemorrhage,
ction and progressive encephalopathy; renal
ure occurred in 34 of 48 dying patients (71%),
no difference between conventionally-
ted and i.v.-treated patients. Hemorrhagic,
ctious or encephalopathic complications were
less important, and represented only 19, 6
2% of the deaths, resp. This study
hasizes the importance of the controlled clini-
trial in the final evaluation of a physiologi-
ly rational and acutely effective therapy. The
rtance of randomization was demonstrated here
he marked differences in survival when patients
classified according to clinical criteria be-
therapy and the lack of appreciable differen-
when randomly assigned treatments are compared.

10839 APPLICATION OF A NEW METHOD OF HEPATOBILIARY SULFOBROMOPHTHALEIN CLEARANCE TO THE STUDY OF HEPATIC FUNCTION IN PATIENTS WITH CIRRHOSIS. (It.) Pieragnoli, E. (G. Ceccarini Hosp., Riccione, Italy), P. Pasini and G. Baldacci. Quad. Sclavo Diagn. 3(1):72-82, 1967.

The authors have devised a new method for the study of liver function based on Tura's method for the mathematical analysis of the kinetics of BSP excretion using an electronic calculator. Since the previous method had permitted the analysis of Segment II (representing the return of BSP from the liver back to the plasma, according to the author) not as an isolated entity but as part of a mathematical evaluation of both segments, the authors applied this method to 21 patients with cirrhosis (diagnosed by clinical examination and laboratory tests), thus obtaining an index of hepatic function as well as a Cholostatic Index. In these patients, a decrease in the Hepatic Function Index was observed ranging from 62 to 82, while the I.C. was generally increased ranging from 2 to 3.8. In order to facilitate understanding of the new method, the authors illustrate the various steps and calculations using data from a sample case. Commercial sodium tetrabromophenolsulfophthaleinate (800 mg) was admin. i.v. to the patient, fasted from the evening before; from a vein in the other arm, blood samples were obtained under basal conditions and 5, 10, 15, 25, 30, 45, 60, 90, and 120 min. after admin. of the dye. Optic density values were obtained spectrophotometrically and plotted on semilogarithmic paper, from which the plasma conc. curve of the dye was subsequently calculated. Further calculations according to the Tura formula produced Hepatic Function Index and Cholostatic Index values (82.3% and 2, 7, resp., in the sample case). The advantages of the new method over previous methods is the possibility of its application to patients with jaundice (thus permitting a distribution between parenchymal and cholostatic damage) as well as its prognostic value.

10840 ASCITES IN CIRRHOSIS. RELATIVE IMPORTANCE OF PORTAL HYPERTENSION AND HYPOALBUMINEMIA. (E.) Castell, D. O. (U.S. Naval Hosp., Great Lakes, Ill.). Amer. J. Dig. Dis. 12(9):916-922, 1967.

The relation of wedged hepatic vein pressure and serum albumin conc. to ascites in 20 patients with portal (alcoholic) or postnecrotic cirrhosis confirmed by needle biopsy of the liver was studied; there were 6 patients with ascites and 14 without diagnosable ascites. The normal range for serum albumin conc. was considered to be 3.8-4.6 g/100 ml, and portal hypertension was defined as a wedged hepatic venous pressure greater than 13 mm Hg. In 6 patients with ascites, all had elevated portal pressure (mean 20.3 mm Hg, with a range of 15-24); the mean serum albumin conc. was 2.9 g/100 ml (with a range of 2.2-3.5). Of 14 without ascites, mean hepatic wedge pressure was 14.4 (with a range of 8-25 mm Hg), and mean serum albumin conc. was 3.6 g/100 ml (with a range of 3.1-5.5 g/100 ml); increased portal pressure was present in 57% (8 of 14) of these patients. The patients with ascites all had wedge pressures greater than the mean pressure of the non-ascites group, and all had serum albumin levels less than the mean of the nonascites group. In the nonascites group, 2 patients had hepatic wedge pressures which exceeded the mean pressure of the ascites group, and all of the patients without ascites had serum albumin levels greater than the mean level of the ascites group. Ascites did not appear in any case with albumin greater than 3.5 g/100 ml, and it was present in all cases with albumin less than 3.1 g/100 ml. Statistical evaluation of the data revealed a much greater correlation of ascites to serum albumin than to wedged hepatic venous pressure. Application of the same analytic methods to a previous report on a larger group of cirrhotic patients revealed similar findings. It is suggested that hypoalbuminemia is of much greater importance than portal hypertension in the pathogenesis of ascites in patients with cirrhosis of the liver.

10841 SECONDARY ALDOSTERONISM IN PATIENTS WITH HEPATIC CIRRHOSIS AND ALDOSTERONE EXCRETION AFTER VASCULAR ANASTOMOSES. (Rus.) Sprintsson, R. G. (Leningrad Med., Sanit. Hyg. Med. Inst., USSR). Vestn. Khir. Grekov 97(10): 15-18, 1966.

Eight males and 2 females (17-40 yr. old) with liver cirrhosis and portal hypertension and with establishment of veno-venous anastomosis exhibited increased aldosterone excretion (indicated by its hypersecretion by adrenal glands and by disturbance of inactivation of liver function), and symptoms of secondary aldosteronism aggrevated by and appearing after surgery. Aldosterone excretion was increased in all cases and some patients developed ascites or edema. In controls (5 healthy males and 5 healthy females, age 20-60 yr.) daily aldosterone excretion in the urine varied between 1-10 μg (av. 6.8). Most of the patients showed hypotonia, 6 had postnecrotic, 3 portal and 1 postnecrotic-portal liver cirrhosis in the compensation or subcompensation phase. Four patients showed ascites before surgery; it was transitory in some and the daily aldosterone excretion by urine varied from 18-45 μg (av. 27.5). The postsurgical course varied, and severity of conditions and lethal outcome were determined by preservation of hepatic parenchyma and postsurgical complications such as: Thrombosis of established vascular anastomosis and hemorrhage from varicose veins of esophagus and stomach. Aldosterone content in daily urine varied from 25-65 μg (av. 40.2). Aldosterone excretion was especially high in the patients with severe postsurgical period and lethal outcome; as a rule they also had pronounced presurgical aldosteronism. Postsurgical aldosteronism was clinically more evident in th form of edema and ascites.

10842 CIRRHOSIS AND JAUNDICE. (Rum.) Pave I., S. Câmpeanu, C. Dumitrescu and H. Bonaparte. Med. Intern. (Bucur.) 19(2):157-169 1967.

The conditions favoring the presence of jaundic in patients with cirrhosis are decreased hemoglobin production and protein deficiency while those combating the disease are permeability of the biliary ducts and regeneration of liver cells. Admin. of 17-methyltestosterone to 14 noncirrhotic patients decreased endogenous bilirubin clearance, while in 3 cirrhotic patients plasma bilirubin clearance remained unchanged. Duodenal catheterization for cirrhosis reveals that the permeability of the intra- and extrahepatic ducts remains normal. In 6 of 7 cirrhotic patients, RBC incorporation of ^{59}Fe decreased enough to suggest a decrease of hemoglobin production; the same phenomenon was prov indirectly by measuring endogenous Fe clearance in cases with nicotinic acid induced hypersideremia. Hemolysis was greatly increased in of 10 cirrhotic patients and endogenous bilirubin was increased in 53 with cirrhosis. Indu hypersideremia and endogenous Fe clearance was increased (as compared to controls) during the first 120 min. following treatment with nicotin acid and the elimination of the circulating endogenous bilirubin was delayed. Admin. of carbachol decreased BSP elimination in 12 cirrhotic patients. In 3 with cirrhotics, jaundice was treated by splenectomy (responsible fo increased hemolysis and hyperbilirubinemia) in 33%, adequate diet and rest in 33%, and diet, rest, and abstinence from alcohol in 33%. In a fourth patient with chronic jaundice (without cirrhosis) and hypertonic Oddi's sphincter who did not respond to splenectomy, bile drainage b duodenal catheter produced complete remission for at least 3 yr.

10843 FUNCTIONS OF THE SPLEEN IN CHRONIC HEPATITIS AND IN CIRRHOSIS. (Fr.) Gheorghesco, B. (Ctr. Gastroent., Bucharest), G. Jovin, E. Merculiev, E. Timis and D. Mardale. Rev. Roum. Med. Int. 3(6):451-457, 1966.

The half-life of RBC labeled with ^{51}Cr was determined in 104 patients with chronic hepatiti or cirrhosis, 33% of whom had splenomegaly or signs of hypersplenism. Scintigraphy with colloidal radioactive Au (particle diameter 40-50 mμ) was done in more than 70 subjects. Controls comprised 8 normal persons. The av. half-life of the labeled RBC was 27 days for controls and 18.1 for those with chronic inflammatory liver disease. Related to this was the image of the spleen appearing in the scintigraphs of those with inflammatory liver diseases but not the image of persons with normal livers. The sequestration of ^{51}Cr-labeled

in the spleen was augmented by inflammatory
er disease which also increased the accmula-
n of colloidal Au in that organ. RBC and
loidal Au were also increased in the liver
elf but not necessarily in direct correlation
h the spleen. Possible common mechanisms for
gocytosis of colloidal Au and retention of
are discussed.

44 THE NEPHROMEGALY OF CHRONIC ALCOHOLICS
WITH LIVER DISEASE. (E.) Laube, H.
ston City Hosp., Mass.), H. T. Norris and
L. Robbins. Arch. Path. (Chicago) 84(3):
-294, 1967.

ney wt. of 89 consecutive cases of chronic
oholics were compared with the degree of their
er involvement, with cases of non-alcoholic
rhosis, and several control groups. The
lowing groups were studied: 1) 17 cases,
nical history of alcoholism, no liver
hology; 2) 17 cases, compensated fatty
ritional cirrhosis; 3) 40 cases, decompensated
ty nutritional cirrhosis; 4) 15 cases, chronic
oholics, fatty livers and varying stages of
rosis, but no cirrhosis; 5) 30 cases, non-
oholic cirrhosis; 6) 30 cases, no history of
oholism and immediate death; and 7) 130
es, patients who died in the hospital of
elated diseases and with no history of
oholism. A significant nephromegaly was pre-
t in all cases of cirrhosis, regardless of
se; this ranged from a 16% increase in non-
oholic cirrhotics to a 31% increase in those
h decompensated fatty nutritional cirrhosis.
degree of nephromegaly was directly propor-
nal to the amount of hepatomegaly. Among
onic alcoholics, the greatest nephromegaly
associated with fatty metamorphosis of the
er, without cirrhosis.. Assay of renal tissue
id, protein, lipid and carbohydrate revealed
accumulation of any 1 these tissue components.
is concluded that nephromegaly was the result
added tissue mass, best explained on the
is of cellular hypertrophy and hyperplasia.

45 EXPERIMENTAL HEPATOCEREBRAL DISEASE.
ASTROCYTIC CHANGES IN THE GLOBUS
LIDUS OF RATS WITH CARBON TETRACHLORIDE
UCED CIRRHOSIS. (E.) Hasson, J. (Washington
Sch. Med., St. Louis, Mo.) and R. W. Leech.
h. Path. (Chicago) 84(3):286-289, 1967.

Alzheimer glia cell, an altered astrocyte
racterized by a striking increase in the size
the nucleus associated with pleomorphism, is
racteristically observed in man in the basal
glia and other parts of the brain in chronic
er disease. In an effort to produce these
nges experimentally, liver cirrhosis was pro-
ed in male Sprague-Dawley rats with CCl_4
ml/kg, admin. 2 times/wk. for 5 wk., for a
al of 10 doses) admin. by gastric intubation.
ssical Alzheimer glia cell changes were not
erved in the globus pallidus of the cirrhotic
rats, but a definite astrocytic response was produced. A significant increase in the mean astrocytic nuclear size in the globus pallidus of cirrhotic rats and shown, as compared to con trol animals. The mean astrocytic nuclear size in 14 cirrhotic rats was 7.04μ±1.30 μ, compared to 6.71 μ± 1.21 μ in 17 control rats. Mean body, liver and brain wt. in 13 cirrhotic rats were 220.2 ± 20.3 g, 12.35 ± 1.81 g and 183.9 ± 5.0 g, resp., compared to 312.0 ± 30.2, 11.16 ± 1.54 and 199.6 ± 7.6, resp., in 17 control rats.

10846 HEPATIC CIRRHOSIS. (Rus.) Vasilev, M. Sofia, Meditsina i Fizkultura, 1966, 201pp., $1.80.

10847 ELECTROPHORESIS PROTEIN PICTURE IN THE ASCITIC FLUID OF HEPATIC CIRRHOSIS. (It.) Pennisi, S. (U. Catania, Italy), F. Romeo and A. Distefano. Riforma Med. 81(30):813-816, 1967.

10848 USEFULNESS OF THE ETHER TEST IN EARLY DIAGNOSIS OF LIVER CIRRHOSIS. (Pol.) Śliwiński, B. Pol. Tyg. Lek. 22(20):757-758, 1967.

10849 IMMUNOELECTROPHORESIS IN DIAGNOSIS OF HEPATIC CIRRHOSIS. (Sp.) Castagnino, J. M. (U. Buenos Aires), E. Navarret and J. Castagnino. Prensa Med. Argent. 54(15):691-693, 1967.

10850 CHANGED AUDITORY ADAPTATION IN CIRRHOTIC PATIENTS DURING PRECOMATOSE PERIOD. (Rus.) Mansurov, Kh. Kh. (Abuali Ibn-Sina Tadzhik Med. Inst., USSR) and L. I. Kal'shtein. Sovet. Med. 30(7):87-89, 1967.

10851 ZINC CONTENT OF ASCITIC FLUID OF MALIGNANT OVARIAN NEOPLASIA AND HEPATIC CIRRHOSIS. (It.) Stefanini, U. (U. Milan, Italy), R. Belgeri and M. Ferruti. Ann. Ostet. Ginec. 89(4):273-277, 1967.

10852 TREATMENT OF COMPENSATED CIRRHOSIS WITH DIURETICS. (Dut.) Rottiers, R. (State U., Ghent, Belgium), J. Van Egmond, A. Vermeulen and L. Demeulenaere. T. Gastroent. 10(1):56-63, 1967.

10853 LIVER CIRRHOSIS OCCURRING AFTER GASTRIC RESECTION. (Ger.) Lázár, D. Klin. Med. (Wien) 22(8):357-359, 1967.

See also abstract nos.: 10089,10406,10539

10854 TRANSHEPATIC DRAINAGE OF THE BILIARY PATHWAYS. (Cz.) Jarošek, H. (Charles U., Prague). Cesk. Gastroent. Vyz. 20(8):547-549, 1966.

Drainage of the biliary pathways is indicated in those cases when primary suture of the common bile duct cannot be performed. The usually applied T-drain has several disadvantages. An improved method of transhepatic drainage combining the advantages of drainage with those of primary suture is described. Using a specially adjusted surgical instrument, penetration was performed from the lumen of the biliary pathways to the convexity of the liver; in the channel formed a silk thread was introduced. A thin polyethylene drain was attached to the end of the thread emerging from the choledochotomy and, by pulling the thread back, the drain was first introduced into the biliary pathways. It was then pulled further through the perforations in the liver and the abdominal wall and attached to the skin. Fixation of the drain to the convexity of the liver was unnecessary. The incision in the common bile duct could be closed with this type of drain. The drain was applied in 25 cases without any complications. Obstructive jaundice accompanied by pronounced disturbance of hemocoagulation equilibrium represents the only contraindication of application of the type of drainage.

10855 SERUM ALBUMIN RESERVE PSP DYE BINDING CAPACITY IN INFANTS WITH KERNICTERUS. (E.) Lucey, J. F. (Queen Anna-Maria Inst. Child Health, Athens), T. Valaes and S. A. Doxiadis. Pediatrics 39(6):876-883, 1967.

Evidence would indicate that albumin exerts a protective action against the toxic effects of bilirubin. The capacity of serum to bind the dye, phenolsulfonphthalein, is related to the conc. of serum bilirubin and other substances which are bound to albumin. A phenolsulfonphthalein binding capacity of over 100 μg/ml serum is considered adequate, indicating that a newborn is safe from bilirubin encephalopathy regardless of the conc. of serum bilirubin. A binding capacity of less than 50 μg/ml is an indication for immediate exchange transfusion. The binding capacity of phenolsulfonphthalein was studied in 93 newborns with total serum bilirubin conc. ranging from 20-52 mg/100 ml. The test was found to be neither reliable nor useful as a screening device in deciding the possibility of kernicterus.

10856 EXPERIMENTAL REPLACEMENT OF THE COMMON BILE DUCT BY MEANS OF A CRIMPED TEFLON TUBE USING THE DUODENAL WALL. I. OPERATIVE TECHNIC. (It.) Rigotti, E. (U. Turin, Italy), M. Dellepiane and R. De Matteis. Arch. Sci. Med. (Torino) 122(6):467-478, 1966.

The authors describe a new technic for the surgical replacement of a portion of the common bile duct using a crimped Teflon tube (diameter 3 mm). The technic had previously been used successfully by the authors for surgical ureter replacement. Ten dogs were subjected to the ne technic in the present report. The prosthesis, corrugated at its outer surface to allow easy bending without reducing the caliber, is passed through a tunnel created within the duodenal wall. Within the prosthesis, a silicon rubber tube is passed which allows passage of bile int the intestine. The rubber tube is kept in plac for 20-25 days (the time needed for organizati of the prosthesis to take place) and then remov The proximal end of the common bile duct is inserted into the lumen of the prosthesis (past the cranial limit of the tunnel) and the outer surface of the common bile duct is then sutured to the proximal end of the prosthesis. The distal portion of the prosthesis is pulled down an inserted into the intramural portion of the com bile duct wall. The technic offers 3 important advantages: (1) the silicon rubber tube permit adequate drainage of bile without danger of obliteration of the newly-formed duct by precipitation of cholesterol and bile pigments; (2 the creation of a submucosal tunnel accelerates the formation of connective tissue and subseque organization of the prosthesis; (3) the use of crimped tube eliminates the danger of bending, frequent cause of bile salt precipitation. The operation was well tolerated and results of laboratory tests were encouraging.

10857 EXPERIMANTAL REPLACEMENT OF THE COMMO BILE DUCT BY MEANS OF A CRIMPED TEFLO TUBE USING THE DUODENAL WALL. II. CLINICAL AN FUNCTIONAL RESULTS. (It.) Dellepiane, M. (U. Turin, Italy), E. Rigotti and R. De Matteis. Arch. Sci. Med. (Torino) 122(6):479-492, 1966.

Results of the experimental replacement of a portion of the common bile duct by means of a crimped Teflon tube are reported in 10 dogs. Death occurred in 3 dogs: Dog A died during surgery, probably from excessive anesthetic (sodium pentothal) dosage or because of intolera to the anesthetic; Dog B died 5 days after surge from choleperitoneum due to dehiscence at the proximal anastomosis site; Dog F died 68 days after surgery from perforated gastric ulcer. In the 7 surviving dogs, determination of serum bilirubin levels and of urinary and fecal bile pigment content, as well as X-ray examination of the biliary tract, were performed 10, 30, 60, 90, and 120 days after surgery; 4 dogs were sacrificed at days 30, 60, 90, and 120, resp., and histological examination of the liver was performed. Serum bilirubin levels were slightly increased (4.3 mg% in 1 animal) at day 10 after surgery, but levels returned to normal by day 30 Urinary bile pigment tests were positive in s at day 10; by day 30, the tests were ive in all but 1 dog. Feces pigmentation ormal in 6 dogs; the feces of dog H were ic between days 15 and 27 but returned rmal afterwards. X-rays revealed pervious- of the prosthesis in all animals; some ation was observed in the tract immediately the prosthesis, but no gallbladder dilata- was seen. Histological studies showed no ation of the hepatic parenchyma. Although umber of animals used is small, the rs feel that results are encouraging and further experimental studies.

EXPERIMENTAL REPLACEMENT OF THE COMMON BILE DUCT BY MEANS OF A ED TEFLON TUBE USING THE DUODENAL WALL. EARLY MORPHOLOGICAL RESULTS. (It.) eis, R. (U. Turin, Italy) E. Rigotti and lepiane. Arch. Sci. Med. (Torino) 122(6): 5, 1966.

copic and microscopic studies were con- in 4 of 10 dogs sacrificed 30, 60, 90, 0 days, resp., after surgical replacement ortion of the common bile duct by means rimped Teflon tube. Gross examination ed the presence of adhesions of varying and consistency between the omentum, al wall, gallbladder, and inferior surface liver. The liver and gallbladder were with respect to appearance, vol., and tency. Squeezing of the gallbladder ed free passage of liquid, normally-colored nto the duodenum. The portion of the common uct above the prosthesis was difficult tinguish and was moderately dilated in nimals. The duodenal wall at the level newly-formed common bile duct presented osal or serosal alterations, nor were flammatory, dystrophic, or cicatricial s present. Duodenal transit was normal. udinal section of the tunnel created the duodenal wall revealed firm attachment prosthesis within the wall, and a solid of connective tissue around the prosthesis. ogical examination revealed a mucosal composed of columnar, muciparous, epithelium andular structures, and a layer of fibrous tive tissue with infiltration of inflam- elements. The submucosal layer contained band of granulation tissue around the The muscular layer was somewhat narrower. dog sacrificed at day 120, the common ct presented a normal lumen lined with a of columnar cells resting on a band of connective tissue. The authors feel en though the observation period is short, formity of results suggests a certain of optimism with regard to this technic on bile duct replacement.

THE DYNAMICS OF THE MAIN BILIARY DUCT AND THE MECHANISM OF THE BILIOPANCRE- FLUX. (E.) Pinotti, H. W. (U. Sao Paulo, Brazil), O. M. DeSousa, J. B. Parolari, V. P. Conte, A. Raia and A. C. Netto. Amer. J. Dig. Dis. 12(9):878-890, 1967.

The dynamics of the main biliary duct and the mechanism of biliopancreatic reflux were studied by means of cinefluorography and electromanometry in 11 patients (2 men, 9 women; 21-60 yr. old, with an av. of 35 yr.) undergoing cholecystectomy because of chronic calculous cholecystitis; 3 also had choledocholithiasis and were treated surgically. Contrast inj. were performed using 3 different types of pressure: 1) residual pressure; 2) passage pressure; and 3) gradual hyperpressure. The patients were distributed in 2 groups: 1) in 7 patients, the kinetic study of the biliary system was made both before and after a fatty meal (ingestion of egg yolks and 100 ml of milk); and 2) 4 patients, subjected to a pharmacodynamic study of the bile ducts, using i.m. inj. of 0.01 g morphine; inhalation of amyl nitrite and i.v. inj. of 0.5 mg of atropine. The terminal portion of the bile duct (the bile-duct sphincter) and the musculature of the ampulla were found to contract together, and a functional autonomy of the sphincter of Oddi was rarely observed. A choledochoduodenal synergy was noted in each case, and spasm of Oddi's sphincter was synchronous with duodenal spasm. Pancreatic reflux occurred with pressure levels varying from 12-50 cm of saline soln.; after a fatty meal, the reflux could be obtained only with high pressures; it was concluded that a fatty meal may hinder the reflux in the pancreatic duct in subjects without biliary disease. No pancreatic reflux was obtained by using drugs; morphine caused total spasm of Oddi components; even a continuous perfusion under pressure above the residual level failed to bring about a reflux into Wirsung's duct, owing to hypertony of the sphincter complex.

10860 OBSERVATIONS ON SINGLE SECTION OF THE SPHINCTER OF ODDI. (E.) Braasch, J. W. (Lahey Clin. Found., Boston, Mass.) and J. C. McCann, Jr. Surg. Gynec. Obstet. 125(2):355-358, 1967.

A heterogeneous group of 231 patients with a diagnosis of stenosis, stricture or spasm of the ampulla of Vater was studied to assess certain features of transduodenal sphincterotomy. For a group of 173 patients, the mortality rate was 4.6% after choledochostomy and transduodenal sphincterotomy with or without a variety of other procedures; in a group who underwent choledochostomy only and transduodenal sphincterotomy, the mortality rate was 5.6%. Of 8 fatal complications, infection was responsible for 3 and pancreatitis for 2 of the deaths. In 15 patients re-exploration at varying times after transduodenal sphincterotomy showed maintenance of the large lumen through the sphincter in almost all cases. No consistent change occurred in duct emptying produced by sphincterotomy as recorded by time-density measurements at cholangiography, but 4 of 5 ducts that were greater than

14 mm in diameter preoperatively were markedly reduced in size postoperatively. In those patients without stones or pancreatitis, transduodenal sphincterotomy produced only 39% satisfactory results in relief of pain. If only large ducts were observed preoperatively, 53% of the patients had a satisfactory result.

10861 THE SITES TO WHICH PAIN IS REFERRED FROM THE COMMON BILE-DUCT IN MAN AND ITS IMPLICATION FOR THE THEORY OF REFERRED PAIN. (E.) Doran, F. S. A. (Mid-Worcestershire Hosp., Bromsgrove & Kidderminster, England). Brit. J. Surg. 54(7):599-606, 1967.

In 56 patients (49 women, 7 men), a small Foley catheter was used to drain the common bile duct after cholecystectomy; on the twelfth postoperative day, when the patient was completely conscious, convalescent and cooperative, the balloon of the catheter was distended and the sites of referred pain ensuing from this procedure were recorded. Five patterns emerged. In 18, pain was referred to the epigastrium and the area about the xiphoid process in the trunk midline; in 1 additional patient it was located slightly lower, in the upper unbilical area and in 1 it was confined to the navel. In 10, pain was referred to the right costal margin and the right hypochondrium. In 6, it was found in the epigastrium and xiphoid area in the midline and radiated through to the back. In 5, it was found only in the back between the shoulder blades and across the lumbodorsal region. In 4, pain was confined to the back, but was unilateral; 1 of these 4 patients experienced the pain on the opposite side of the back by the lower angle of the left scapula. In 11 patients, no pain was experienced anywhere, in spite of considerable tension in the balloon. The implication of this study for the theory of referred pain is discussed in detail. Ample evidence exists that the first stage of the afferent pathway from the biliary tree to the brain lies in the splanchnic nerves and the corresponding filaments of the abdominal sympathetic networks, and that usually the innervation is bilateral. The variations in the sites to which pain is referred from the common bile duct show that, embryologically, the position of the common duct, remote from the neural crest, greatly reduces its ability to attract pain afferents to it. The different sites to which pain is referred from the common duct is contradictory to the notion of true visceral pain as a pain occurring in a viscus. This series also demonstrates that pain confined to the right upper abdominal quadrant is not, by itself, evidence that local peritonitis has developed. Finally, the fact that distention of the common bile duct often produces pain in the back disposes of the widespread belief that this is evidence of the involvement of the posterior wall of the abdominal cavity by the disease process. The physiological mechanism of referred pain depends on nothing more complex than the termination of pain afferents from t viscera, the deep somatic structures, and the skin, on a common pool of connector neurons in the same segment of the spinal cord; this theory requires only the basic physiological process of summation to make it explain the observed clinical facts. The exact site to which a pain of visceral origin is referred is almost certainly finall determined by the higher centers in the brain

10862 A COMBINED METHOD FOR DIAGNOSIS I MALIGNANT JAUNDICE. (E.) Sato, (Tohoku U., Sendai, Japan), G. Kakizaki, Y. Saito, T. Maki and K. Koyama. Arch. Surg. (Chicago) 95(2):207-216, 1967.

A combined diagnostic method, consisting of the pancreatic exocrine function test, 2) percutaneous transhepatic cholangiography, 3 splenoportography, and 4) selective arteriog was used in 46 cases of malignant jaundice d to cancer of the pancreas and the biliary system. There were 31 cases of periampullar cancer (which in this study was defined so a include cancer of the head of the pancreas (cases), cancer of the intrapancreatic bile d (12 cases) and cancer of the papilla of Vate (7 cases)), 11 cases of cancer of the extrap creatic bile duct and 4 cases of cancer of t gallbladder. With regard to location of obstruction, 25 (81%) of 31 cases of periampul carcinoma were correctly diagnosed preoperat among which the accuracy was 67% in 12 cases of carcinoma of the intrapancreatic bile ducts. Diagnosis was accurate in all 6 case of carcinoma of the extrapancreatic bile duc but it was lowest (50%) in 4 cases of cancer of the gallbladder. Of the 46 cases of cancer of the biliary system, 38 (83%) were diagnosed accurately. With regard to resect bility, 26 of 27 (96%) were predicted corre in the case of periampullary carcinoma, whil 78% were accurately preducted in 9 cases of carcinoma of the extrapancreatic bile ducts. Of 3 cases of cancer of the gallbladder, 2 were predicted accurately before laparotomy. In total, the diagnostic accuracy was as high as 90% (35 of 39) with regard to resec ity in carcinoma of the pancreas and the bi tract.

10863 CINE-CHOLANGIOMANOMETRY: PHYSIOL OBSERVATIONS. (E.) Beneventano T. C. (Montefiore Hosp., New York, N. Y.), H. G. Jacobson, E. S. Hurwitt and C. J. Sch Amer. J. Roentgen. 100(3):673-679, 1967.

Among 15 patients referred for postoperativ cinecholangiography, with film strips deriv at graded increments of intracholedochal pr (+5 cm contrast medium, repeated to a max. of 50 cm sodium diatrizoate), contractions the common bile duct originated only in the vaterian segment, from which they were tran

lively. Involved was a rhythmic process of
xation and contraction, arising in the distal
ent and apparently representing diastolic
systolic phases of choledochal sphincter
vity. During the systolic phase, the
al end of the duct was sufficiently
racted to prevent flow of the contrast
um into the duodenum. The diastolic
e, in turn, began with the opening of
contracted segment, extended to the rest
he duct through a period of progressive
xation, and terminated with the start
new systolic contraction. The duration
ystole at baseline passage pressure ranged
0.5-4.3 sec.; that of diastole, from
5.3 sec. Both phases were lengthened
eciably in response to increase of pressure
in the duct. No patient experienced pain
aseline passage pressure, which was highly
vidualized; all experienced pain when
aductal pressure was increased by 13-26
ater above the individual baseline: i.e.,
-58 cm water (mean - 39 cm). Seven of 15
ects experienced reflux of the contrast
m into the pancreatic duct, occurring in
nstances below the individual's pressure-pain
hold level and thus appearing to indicate
pain did not result from filling or
ntion of the pancreatic duct in itself,
ugh it was relieved immediately when the
was permitted to empty. There was no
nce of pancreatitis resulting from such
eatic duct reflux.

INTELLIGENCE OF CHILDREN WHOSE
MOTHERS HAVE BILIARY TRACT DISEASE.
Churchill, J. A. (Wayne State U., Detroit,
), M. A. Ayers and D. F. Caldwell. J.A.M.A.
):482-484, 1967.

ntelligence of children whose mothers
olecystectomies for cholelithiasis, with
thout cholecystitis, was compared to the
ligence of control children. The number
ildren tested was 39, since some mothers had
dren enrolled in the project. The
er Intelligence Scale for children was
ychometric test used. The control group
oup with maternal biliary-tract disease
mean IQ of 113.1 and 100.6, resp. Within
oup with maternal biliary-tract disease
elation between severity of maternal
s and IQ of the child was found. It is
ded that maternal biliary-tract disease
terfere with fetal brain growth resulting
manent limitation of intellectual develop-
It is speculated that the availability
oleic acid for fetal brain development
be decreased in pregnant women who have
y tract disease.

INJURY TO THE SPHINCTER OF ODDI IN
THE COURSE OF GASTRIC AND DUODENAL
Y. (E.) White, T. T. (U. Washington,
e), E. R. Sanderson and A. Morgan.
J. Surg. 114(2):247-253, 1967.

Six further cases of operative injuries to the ampulla of Vater are described, in addition to the 65 injuries of this type which have been previously reported in the literature; 69 of 71 injuries occurred during gastric resection for chronic duodenal ulcer. One of the 6 cases described occurred during excision of a large duodenal diverticulum and the other occurred during excision of a duodenal polyp. Usually the ulcer which necessitated gastrectomy was postbulbar or in the second part of the duodenum, causing considerable deformity. In only 9 of 69 cases of ulcer was the ampulla separated deliberately; in 13 cases, the surgeon was attempting to reach distal to the ulcer by freeing the duodenum from the pancreas from below upwards. Another cause of this injury was overenthusiastic mobilization of the duodenum by the Kocher maneuver before dealing with the duodenal stump. Most of the cases were recognized at the time of accidental injury; only 14 of 62 passed unrecognized. In cases in which the injury was accidental, 8 patients of a total of 61 died. Deliberate separation and reimplantation resulted in no deaths in 10 cases. A method of duodenal advancement and anastomosis to the area of the ampulla together with drainage by transduodenal catheters of 2 to 4 F polyvinyl tubing in each duct is the most acceptable operative repair in these cases. Vagotomy and pyloroplasty is a preferred method of avoiding this injury.

10866 THE EXTERNAL DRAINAGE OF BILE
PASSAGES AFTER PAPILLOTOMY.
(Rus.) Gausman, B. Ia. (Kemerovo Med. Inst.,
USSR). Vestn. Khir. Grekov 98(4):52-54, 1967.

External drainage of bile passage following transduodenal papillotomy was used in 3 female patients (2 are 37, 1 is 66 yr. old) with stones in the terminal part of the common bile duct, which could not be removed by supraduodenal incision. One end of a polychlorvinyl tube (diameter 5 mm) was introduced into the hepatic duct through the resected papilla, above the location of the common bile duct opening; then a thick gastric sound was introduced through the mouth, drawn into the duodenal incision and attached to the end of the polychlorvinyl tube and extricated back through the mouth; sutures on the common bile duct and duodenum were established and after extubation the sound was transferred from the oral cavity through the lower meatus nasi out. This method has the following advantages: enables suture on the common bile duct; decreases danger of peritonitis; prevents development of postsurgical pancreatitis and intestinal paresis; decreases danger of separation of the sutures of the duodenal wall; drainage is controllable, deprived of deficiencies of common internal drainage; and the postsurgical period passes relatively easily, despite severe surgery.

10867 UROCHOLECYSTOKININ IN DIAGNOSIS OF EXTRAHEPATIC BILIARY DUCTS. (Rus.) Popova, E. A. (1st Moscow Sechenov Med. Inst.), A. A. Zychkova, A. E. Fioletova and T. V. Gol'tiakova. Ter. Arkh. 39(3):37-40, 1967.

Fifty persons, 16 with chronic cholecystitis, 12- gallbladder dyskinesia, 3- postcholecystectomy syndrome, and 4 without pain syndrome were observed 2-5 yr. after gallbladder removal; 15 controls were also studied. Nine of 16 with chronic cholecystitis showed a decrease in intensity of gallbladder shadow at contrast roentgenography and in 5 there were concrements; in 7 the shadow was good with 4 of the 7 showing concrements. Eight of 12 with gallbladder dyskinesia showed a hypotonic form while in 4 others the gallbladder showed no roentgenological changes. Urocholecystokinin content (determined by Svatoš method) in the urine, taken 1.5 hr. after admin. of irritants ($MgSO_4$ or sunflower oil), was determined in guinea pigs. In 7 patients with chronic cholecystitis with preserved conc. function of gallbladder, urocholecystokinin content (on empty stomach and after admin. of irritants) was normal, e.g., 0.08-0.1 and 0.14-0.16 dog U, resp., while in 9 patients with disturbed conc. function of gallbladder it decreased, e.g., 0.02-0.04 and 0.08-0.12 dog U, resp. In 12 patients with dyskinesia and 3 with postcholecystectomy syndrome, resp., values were 0.15-0.20 and 0.28-0.40 dog U, e.g., urocholecystokinin content was increased; and in 4 patients without pain sensation it decreased, e.g, 0.04-0.08 and 0.02-0.04 dog U. Determination of urocholecystokinin in patients with different gallbladder pathology showed definite regularity and could be an additional test in diagnosing gallbladder diseases.

10868 THE INFLUENCE OF DIHYDROERGOTAMINE ON CERTAIN HEPATIC FUNCTIONS IN MAN. (Fr.) Charbonnier, A. (Cochin Hosp., Paris) and M. Cachin. Sem. Hop. Paris 43(25):1673-1684, 1967.

The possible effects of dihydroergotamine upon the contraction of the gallbladder, the secretion of bile, and BSP clearance were investigated. Dihydroergotamine had no cholecystokinetic effect; the wave of contraction sometimes observed in cholecystography at the base of the gallbladder was never associated with the passage of bile from the gallbladder into the duodenum. Dihydroergotamine caused a brief decrease in bile flow followed by an increase; there was no effect upon the composition of the bile. It is suggested that this effect is due to the action of this preparation upon the blood vessels. Admin. of 2 mg i.v. immediately before the inj. of BSP seemed to have an effect on the clearance of the dye, usually accelerating it. Dihydroergotamine also interfers with galactose tolerance tests.

10869 TREATMENT OF THE COMMON BILE DUCT
PANCREATITIS. (E.) White, T. T.
(U. Washington Sch. Med., Seattle) and J. E.
Murat. Amer. Surg. 33(7):524-528, 1967.

The following types of operations were perfo
on 182 of 733 cases with pancreatitis: 66 h
common duct explorations only, 80 had sphinc
tomies, 16 choledochoenterostomies, 9 long
arm T-tubes and 8 dilatations of the sphinct
of Oddi as well as common duct exploration.
these 182 patients, 140 were classified as h
ing acute pancreatitis and among these 101 h
stones in the common bile duct. Of those wi
acute pancreatitis, 27 were jaundiced, 17 we
alcoholic and 11 had a duodenal ulcer. The
remaining patients were considered to have
chronic pancreatitis indicating permanent
change in the pancreas: a third of these ha
intrapancreatic calcification, nearly half w
alcoholics and 11 had associated gallstones.
In addition, there were 22 patients with pos
operative pancreatitis of whom 18 had gallst
and nearly half had common bile duct stones.
In the total group of 204 patients 22 were
treated by 7 mm or more dilatation of the
sphincter of Oddi: 10 died. Also in this s
a long-arm T-tube (size 12F or greater) was
installed in 14 patients, of whom 6 subsequ
died while a number of others had difficult
postoperative courses. In contrast common
duct exploration with probes up to 5 mm pro
relatively little morbidity. In conclusion
choledochoenterostomy is the preferred meth
drainage where there is a long stricture of
distal common bile duct, whereas sphinctero
or sphincteroplasty is preferred in treatin
common bile duct when the sphincter of Oddi
localized obstruction.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology had accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis and Metabolic Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by Index Medicus. For Journals not covered by Index Medicus, the abbreviations (with some modifications) found in World Medical Periodicals, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	Gr.	Greek	Pol.	Polish
Ar.	Arabic	Heb.	Hebrew	Por.	Portuguese
Bul.	Bulgarian	Hun.	Hungarian	Rum.	Rumanian
Ch.	Chinese	Ic.	Icelandic	Rus.	Russian
Cz.	Czech	In.	Indonesian	Ser.	Serbo-Croatian
Dan.	Danish	It.	Italian	Sl.	Slovene
Dut.	Dutch	Jap.	Japanese	Sp.	Spanish
E.	English	Kor.	Korean	Sw.	Swedish
Eston.	Estonian	Latv.	Latvian	Th.	Thai
Fin.	Finnish	Lith.	Lithuanian	Turk.	Turkish
Fr.	French	Maced.	Macedonian	Uk.	Ukrainian
Ger.	German	Nor.	Norwegian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	µM	micromolar
admin.	administered, administration	max.	maximum, maximal
ADP	adenosine diphosphate	mc,µc	milli-, microcurie(s)
ATP	adenosine triphosphate	mg	milligram(s)
approx.	approximately	min.	minute(s)
av.	average(d)	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
°C	degrees centrigrade	mo.	month(s)
cm	centimeter(s)	MTD	maximum tolerated dose)
CNS	central nervous system	ng	nanogram (10-9)
conc.	concentrate(d),	pg	picogram (10-12)
	concentration(s)	p.o.	orally
cpm	counts per minute	ppm	parts per million
DNA	deoxyribonucleic acid	r	Roentgen
e.g.	for example	RBC	red blood cells (erythrocytes)
g	gram(s)	resp.	respectively
µg	microgram(s)	Rev.	review (only in cite)
hr.	hour(s)	RNA	ribonucleic acid
i.m.	intramuscular	s.c.	subcutaneous
inj.	injected, injection(s)	sec.	second(s)
i.p.	intraperitoneal	SGOT	serum glutamic-oxalacetic transami
I.U.	international unit(s)	SGPT	serum glutamic-pyruvic transaminase
i.v.	intravenous	soln.	solution(s)
kg	kilogram(s)	U	unit(s)
LD_{50}	median lethal dose(s)	UV	ultraviolet
LDH	lactic acid dehydrogenase	vol.	volume
m	meter(s)	SBC	white blood cells (leukocytes)
M	molar		or count
mEq	milliequivalent(s)	wk.	week(s)
mM	millimolar	wt.	weight(s)
	yr.	years	

917 AFFERENT NERVOUS DISCHARGE FROM THE
CANINE LIVER. (E.) Andrews, W. H. H.
. West Indies, Jamaica) and J. F. Palmer.
art. J. Exp. Physiol. 52(3):269-276, 1967.

patic nerve strands of the dog were dissected
d analyzed for afferent impulses. Many of the
rve strands manifested resting afferent dis-
arges, which were profuse in character at times.
etylcholine (10-50 μg) inj. into either the
patic artery or portal vein resulted in
ferent discharges in all intact hepatic nerves
aluated. The highest measured potential was
μvolts and all responses seemed to be dose-
ated. In some cases, an arterial pressor
action associated with acetylcholine admin.
observed. Sensory receptor discharge was
o associated with sodium cyanide inj. into
liver circulation. A discharge (10-20 μvolts)
achieved in less than a tenth of the nerves
ted. Discharge patterns were unaffected and
activity was evoked subsequent to epinephrine
norepinephrine inj., while 2,4-dinitrophenol
not substantially affect the rate of nerve
charge. Occlusion of the inferior vena cava
also mechanical increase in the biliary
ssure did stimulate hepatic sensory activity.
is concluded from this last experiment that
contribution of the nerve fibers from the
iary receptors to the hepatic nerves is small.

18 HYPOTHALAMIC LESIONS RELATED TO INGES-
TION OF AN IMBALANCED AMINO ACID DIET.
) Nasset, E. S. (George Washington U. Sch.
., Washington, D. C.), P. T. Ridley and E. A.
enk. Amer. J. Physiol. 213(3):645-650, 1967.

e Sprague-Dawley rats were grouped into 3
ssifications: 1) normal rats; 2) rats with
ateral lesions placed in the ventromedial
lei of the hypothalamus; and 3) hyperphagic
s. The animals were fed a control diet, and
imbalanced amino acid diet, the imbalance
ng produced by adding an amino acid supplement
t contained all of the essential amino acids
ept histidine. Normal rats consumed only
-thirds as much imbalanced amino acid diet as
trol diet; rats with the hypothalamic lesions
t the ability to discriminate between the 2
ts; hyperphagic rats ingested both diets
ally and gained equally in body wt. Excessive
estion of the imbalanced diet for 6 days pro-
ed a reduction in zymogen granules in pan-
atic acinar cells and in stainable mucin in
gastric antral mucosa. These findings
onstrate that the intact ventromedial nuclei
the hypothalamus integrate the signals that
ermine the ultimate refusal of the normal
mal voluntarily to eat a diet containing an
alanced amino acid mixture.

9 UTILIZATION OF 11β-HYDROXYSTEROIDS BY
THE SALIVARY GLAND DUCTS. (E.)
Ferguson, M. M. (U. Glasgow, Scotland).
Histochemie 9(3):269-274, 1967.

The presence of pyruvate oxidase, isocitric dehydrogenase, α-ketoglutarate oxidase, succinic dehydrogenase, malate dehydrogenase and furfuryl alcohol dehydrogenase activity in the parotid, submandibular and sublingual glands (which had been removed from rats) was significant enough to indicate high metabolic activity. While the enzymes involved with the tricarboxylic acid cycle were highly active in the glands, 11β-hydroxysteroid dehydrogenase was more active in the ducts of the parotid and submandibular glands. In the ducts, 11β-hydroxysteroid dehydrogenase displayed marked substrate specificity utilizing 11β-hydroxyandrostenedione and cortisol but not 11β-hydroxyestrone or 11β-hydroxyprogesterone. The enzymes of the tricarboxylic acid cycle were also present, although less abundantly, in the ducts, indicating a highly active metabolic duct epithelium. The greater activity was in the interlobular ducts indicating different functional zones. As it has been previously shown that corticosteroids affect salivary electrolyte conc., this localization of 11β-hydroxysteroid dehydrogenase would seem to show that the ducts are the site of this corticosteroid activity.

10920 HUNGER AND SATIETY SENSATIONS IN MEN, WOMEN, BOYS, AND GIRLS. (E.) Monello, L. F. (Harvard Sch. Public Health, Boston, Mass.) and J. Mayer. Amer. J. Clin. Nutr. 20(3):253-261, 1967.

The subjective experiences of hunger and satiety were determined in 603 adolescents and adults of both sexes by means of a multiple-choice questionnaire survey; the subjects were white, middle-class Americans and included 192 men, 20-61 yr. old; 165 women, 20-67 yr. old; 101 boys, 11-15 yr. old; and 145 girls, 9-20 yr. old. It was found that, in addition to specific gastric sensations, diffuse elements of restfulness and excitability seemed salient in the hunger experience. Males appeared to experience hunger in a more specific physical way than females, whose experience appeared more diffuse and cerebral; this sex difference was more marked among adults than among adolescents. Just prior to a meal, there appeared to be an abrupt increase in mouth and throat sensations, urge to eat, and moods of cheerfulness and excitement. After several bites of food at the meal, the affective quality of physical sensations appeared to change from unpleasant to pleasant. In contrast to the many and diverse sensations of hunger, only vague sensations of gastric bulk and feelings of satisfaction and relaxation seemed to be the major sensations experienced during satiety. Adolescents described satiety as more intensely gastric than adults and seemed to continue to feel mild hunger sensations longer after the meal than adults. Diffuse feelings of warmth and relaxation appeared to be more salient elements in satiety among adults. Both male and female adults reported more intense sensations during extreme hunger than adolescents.

10921 INTESTINAL ALKALINE PHOSPHATASE IN HUMAN SERUM. (E.) Posen, S. (U. Sydney, Australia), F. C. Neale, D. J. Birkett and J. Brudenell-Woods. Amer. J. Clin. Path. 48(1):81-86, 1967.

Sera from normal blood donors were subjected to electrophoresis on strips of cellulose acetate, and classified into 2 categories, those with a slow-moving alkaline phosphatase band and those without such a band; 10 sera from each group were studied further. Phenylalanine inactivation was measured in these 20 sera; alkaline phosphatase activities were determined in the presence and absence of 5×10^{-3} M L-phenylalanine. Antihuman intestinal alkaline phosphatase activity was assessed. With 5×10^{-3} M L-phenylalanine, sera without a slow-moving zone were inactivated to a mean of 59.3% of their original activities, whereas those with a slow-moving zone retained only 49.8% of their activities. When the phenylalanine conc. in the assay system was 2.5×10^{-3} M, the mean activity of sera not containing a slow-moving zone was 84.9±7.4% of the controls, whereas the mean activity of the sera with the slow phosphatase zone was reduced to 73.9±5.5% of the control sera. The effect of the anti-intestinal alkaline phosphatase preparation was such that those without the slow-moving band lost a mean of 3.5% of their original alkaline phosphatase activity, and those with a slow-moving band lost a mean of 12%; this difference was significant. These findings show that normal sera containing electrophoretically slow-moving alkaline phosphatase are more susceptible to L-phenylalanine and to anti-human intestinal alkaline phosphatase antibody than normal sera that do not contain this slow-moving component. A good correlation existed in individual sera between phenylalanine sensitivity and antibody sensitivity. These results constitute further evidence that slow-moving alkaline phosphatase is of intestinal origin. In sera containing intestinal alkaline phosphatase, this enzyme accounts for approx. 20% of the total alkaline phosphatase activity.

10922 THE ROLE OF GLYCOPROTEINS AND OF NEURAMINIC ACID IN THE GASTRIC AND INTESTINAL MUCOUS MEMBRANES. II. (Rus.) Mnatsakanian, A. A. Zh. Eksp. Klin. Med. 7(1):25-31, 1967.

Albino rats (120 divided into 7 groups) were kept on the following diets before sacrifice: Group 1, starvation for 24 hr. (control); Group 2, starvation for 24 hr. followed by feeding with milk; Group 3, the same, but feeding with meat; Group 4, the same, but feeding with bread; Group 5, the same, but feeding with bread, milk, and tomatoes; Group 6, feeding continuously with bread and meat; Group 7, starvation for 48 hr. Regardless of the functional state of the digestive tract the glycoprotein content of the muco membranes decreased in the following order: stomach (700-1300 mg%), duodenum (480-870 mg%), and the distal part of the small intestine (480-810 mg%). The lowest glycoprotein content of t mucous membranes was found in animals starved f 24 hr. (Group 1: stomach, 700 mg%; duodenum, 480 mg%; distal part of the small intestine, 480 mg%). After feeding (Groups 2-6) or prolon starvation (Group 7) the glycoprotein content o the mucous membranes increased by 330-600 mg%. This increase depended on the diet and the inte val between feeding and sacrifice. Feeding wit bread or meat led to a more pronounced increase than with milk, max. levels of glycoproteins being reached 1-2 hr. after feeding. The neuraminic acid content of the mucous membranes of animals starving for 26 hr. (stomach, 63 mg%; duodenum, 43.5 mg%; small intestine, 42.5 mg%) also increased by 33-74.5 mg% after prolonged starvation or feeding with any of the foods exc milk. Max. levels of neuraminic acid were obse 1-2 hr. after feeding. Animals fed with bread meat (Group 6) had the highest levels of neuraminic acid in the mucous membranes (gastric, 137.5 mg%; duodenal, 81.5 mg%; intestinal, 75 m It is considered that increased levels of glyco teins and of neuraminic acid may protect the mucous membranes against the action of proteoly enzymes.

10923 PHYSIOLOGY OF THE DIGESTIVE TRACT; AN INTRODUCTORY TEXT. (E.) Davenport, H. W. Chicago, Year Book Medical Publishers, 1966, 230pp., $8.50.

10924 PRESENCE OF TWO KALLIKREINOGENS IN SWINE PANCREAS AND AUTOMATED DETERMIN TION OF KALLIKREIN AND KALLIKREINOGEN. (Ger.) Fiedler, F. (U. Munich, Germany) and E. Werle. Hoppe Seyler Z. Physiol. Chem. 348(8):1087-1089 1967.

10925 AN ASSAY METHOD FOR PADUTIN (HOG PANCREAS KALLIKREIN) BASED ON THE IN VITRO RELEASE OF KININ IN HUMAN PLASMA. (E Bieltvedt, G. (U. Oslo) and K. Briseid. Acta Pharmacol. (Kobenhavn) 25(2):190-196, 1967.

10926 ACTION OF ALKALI ON BOVINE AND OVINE SUBMAXILLARY MUCINS. (E.) Bertolin M. (New York Med. Coll., N. Y.) and W. Pigman. J. Biol. Chem. 242(17):3776-3781, 1967.

10927 ENZYMATIC SYNTHESIS OF THE PROTEIN-HEXOSAMINE LINKAGE IN SHEEP SUBMAXILLARY MUCIN. (E.) McGuire, E. J. (Johns Hopkins U., Baltimore, Md.) and S. Roseman. J. Biol. Chem. 242(16):3745-3755, 1967.

928 THE DEPRESSOR ACTIVITY OF TRYPSIN-LIKE ENZYMES PURIFIED FROM RAT SUBMANDIBULAR
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Malmiharju, P. J. Riekkinen and V. K. Hopsu-
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929 SALIVARY IMMUNOGLOBULINS: NORMAL ADULT VALUES AND DISSOCIATION BETWEEN SERUM
SALIVARY LEVELS. (E.) Claman, H. N. (U.
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HLOROINDOLE-3-YL-β-D-FUCOPYRANOSIDE. (E.)
erly, J. R. (Fort Detrick, Frederick, Md.),
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31 EFFECT OF HYPERVITAMINOSIS A ON INTESTINAL LIPIDS OF RATS. (E.) Misra, U. K. (V. P. Chest Inst., Delhi, India). Canad. J. Biochem. 45(9):1413-1418, 1967.

10932 ULTRAMICROSCOPIC STUDY OF ENTEROCHROMAFFIN CELLS AFTER CERTAIN STIMULATIONS. (It.) Gasbarrini, G. (U. Bologna, Italy), V. Freyrie, A. Lancellotti, E. Labriola and L. Gasbarrini. Riv. Gastroent. 18(6):477-494, 1966.

10933 HISTAMINE AND HISTIDINE DECARBOXYLASE IN THE UPPER DIGESTIONAL TRACT OF MAN, DOG, GUINEA PIG AND RAT. (Ger.) Lorenz, W. (U. Munich, Germany), K. Pfleger and E. Werle. Naunyn Schmiedeberg Arch. Pharm. Exp. Path. 258(2):150-159, 1967.

10934 LACTATE DEHYDROGENASE ISOENZYMES IN RAT SMALL INTESTINAL MUCOSA, LIVER, KIDNEY AND SERUM, DURING THE ADMINISTRATION OF CINCHOPHEN. (E.) Willman, K. (U. Turku, Finland), O. Hänninen and K. Hartiala. Ann. Med. Exp. Fenn. 45(2):235-238, 1967.

10935 ORGAN CULTURE OF FETAL RAT PANCREAS: 1. EFFECTS OF GLUCOSE, OTHER COMPOUNDS OF THE CULTURE MEDIUM AND A SULFAMIDE ANTI-DIABETIC AGENT. (Fr.) Vecchio, D. (U. Geneva, Switzerland) and A. E. Gonet. *Helv. Physiol. Pharmacol. Acta* 25(1):103-122, 1967.

Excised pancreas from 18-day-old fetal rats were cultured for up to 1 wk. Insulin was measured in the homogenates of pancreatic tissue by a radioimmune method. Glucose was increased in the cultures of some explants and in others tolbutamide was present in the culture medium (81 µg/ml). The exocrine tissue retained a fetal appearance although organized into acini to some degree. Considerable differentiation and multiplication of endocrine cells occurred with the rise of typical β-granules during the culture period. The pancreatic insulin content measured biologically or immunologically was less than 0.5 mU/mg at the time of explantation and increased during the culture period to 3.5 mU/mg at 4 days and 14.0 mU/mg at 7 days thus demonstrating the occurrence of insulin biosynthesis *in vitro*. The conditions most favorable for this development include the addition of 5% each of serum and fetal extract to the culture medium. Both glucose and tolbutamide exerted trophic effects upon pancreatic explants in the culture. The optimal conc. of glucose was between 11 and 16.5 mM resulting in a relative increase of endocrine tissue without exhaustion or degeneration of the β-cells; this was indicated by the increase of insulin content in the explants. Tolbutamide caused an increased differentiation of endocrine tissue but without increased insulin content of the tissue. It is possible that with tolbutamide the insulin was released into the medium.

10936 A COMPARATIVE STUDY OF THE ULTRASTRUCTURE OF MICROVILLI IN THE EPITHELIUM OF SMALL AND LARGE INTESTINE OF MICE. (E.) Mukherjee, T. M. (U. Otago Med. Sch., Dunedin, New Zealand) and A. W. Williams. *J. Cell Biol.* 34(2):447-461, 1967.

The fine structure of the microvilli on jejunal and colonic epithelial cells of the mouse intestine was analyzed and compared. In these 2 locations, the microvilli demonstrated a remarkably similar fine structure with respect to the thickness of the plasma membrane, the extent of the filament-free zone, and the characteristics of the microfilaments situated within the microvillous core. Some of the core microfilaments appeared to continue across the plasma membrane limiting the tip of the microvillus. The chief difference between the microvilli of small intestine and colon was in the extent and organization of the surface coat. In the small intestine, in addition to the commonly observed thin surface fuzz reported by earlier workers, occasional areas of the jejunal villus showed a more conspicuous surface coat covering the tips of the microvilli. The surface coat was an integral part of the epithelial cells. In contrast to the jejunal epithelium, the colonic epithelium was endowed with a thicker surface coat. Variations in the organization of the s face coat at different levels of the colonic crypts were also observed.

10937 LONGITUDINAL DIFFERENTIATION OF THE SMALL INTESTINE. (E.) Baintner, K. Jr. (U. Med. Sch., Budapest) and B. Veress. *Nature (London)* 215(5102):774-776, 1967.

Morphological differences were noted between t upper and lower parts of the small intestine c suckling rats during a histological study of γ globulin absorption. Duodenal epithelial cell of these rats resembled those of adults, but their ileal cells were of a different type, exhibiting large vacuoles giving the impressic of being "hollow" in paraffin-embedded sectior The vacuoles were also clearly visible in the unstained suspension of living cells and conta fluid but no fat or mucus. On staining with mucicarmine, only a few goblet cells were note among the "hollow" cells; the vacuoles of the latter frequently contained periodic acid-Schi positive inclusion bodies, yellow in color in unstained and eosinophilic in stained preparations. Transition between the "hollow" and nc mal epithelial cell was gradual. Macroscopica the upper part of the small intestine of the suckling rat appeared milky white, whereas its lower part, containing the hollow cells, was yellowish-brown in color; the inclusion bodies were probably responsible for this coloration. The ileal cell type just described was also found in the mouse and guinea-pig, but not in the dog, goat, pig and cat; unlike the rat, guinea-pigs had no inclusion bodies in their "hollow" cells.

10938 CURRENT VIEWS ON THE MICROSCOPIC STRUCTURE OF THE LIVER. (E.) Kuś, (Dept. Descriptive & Topograph. Anat., Cracow, Poland). *Acta Med. Pol.* 8(2):185-194, 1967.

Current studies by the microcorrosion method support the concept that the portal lobule supplied by the proper interlobular triad is the structural and functional U of the liver which constructed of liver platelets, not trabeculae The portal lobule has a triangular shape and i the center of the triangle, surrounded by a variable amount of connective tissue, lies the portal triad with the central veins on its per ery. In corrosion preparations, these areas h the appearance of pyramids composed of casts o the capillary sinusoids. The capillary sinuso of the liver stretch from the terminal venules the central veins. They are lined with endoth which is discontinuous and they differ from ordinary capillaries with respect to the prese

Kupffer cells with pronounced phagocytic
operties and the capability of storage and pro-
ction of antibodies. The distribution of these
lls is determined by the scheme of the portal
bule; the greatest conc. in the area of the
rtal triad. The liver cells are arranged into
atelets 1 cell in width. Between 2 adjacent
patocytes a bile ductule runs, the walls of
ich are formed by grooves covered with micro-
lli. The hepatocytes are in contact with the
pillary sinusoids through microvilli projecting
to the spaces of Disse.

939 VASCULAR ARCHITECTURE OF THE GASTRIC
WALL IN MAN AND SOME EXPERIMENTAL
IMALS. (Pol.) Karmański, J. (Inst. Norm.
at., Zabrze, Poland) and A. Pisarski. Folia
rph. (Warsz.) 25(4):615-621, 1966.

ood vessels of the gastric wall of man, dogs,
bbits and rats, inj. with pigmented latex and
ained by the method of Grant and Slonimski were
udied and compared. The subserosal vascular
twork is closely connected with the plexus of
muscular membrane. The muscular membranes
supplied by branches from the main gastric
ssels and from the submucosal plexus. In man
dog venous and arterial networks are located
ween the circular and longitudinal muscular
ers of the stomach. In the submucosal layer,
addition to the submucosal plexus, another
ller one, composed of veins typical for con-
tive tissue, was found. In man and dog, besides
venous network of the submucosa, there exists
ve the muscularis propria of the mucosa another
ous plexus. In dogs, blood vessels in the
osa which, until recently, were described as
iating arteries are actually veins. They have
racteristic constrictions and lead to the
xus above the muscularis propria of the mucosa.
vascularization of the mucosa was almost iden-
al in all the species. The greatest similar-
es were found between the gastric vasculariza-
n of dog and man and greatest differences
ween that of the rat and man.

40 ULTRAMICROSCOPIC APPEARANCE OF
ENTEROCHROMAFFIN CELLS IN THE DUODENUM
UNDER FASTING BASAL CONDITIONS. (It.)
parrini, G. (U. Bologna, Italy), F. Freyrie,
abriola, A. Lancellotti and N. Melchionda.
Gastroent. 18(6):391-405, 1966.

41 THE PANCREATIC DUCTS IN LOWER PRIMATES.
(Pol.) Kubik, W. (Inst. Norm. Anat.,
zig, Poland). Folia Morph. (Warsz.) 26(3):
261, 1967.

42 ULTRASTRUCTURE OF THE ERGASTOPLASM OF
PANCREAS ACINAR CELLS AS REVEALED BY

TOPOOPTICAL STAINING REACTIONS. (E.) Romhány, G. (U. Med. Sch. Pecs, Hungary) and G. Deák. Acta Biochim. Biophys. Acad. Sci. Hung. 2(2):115-129, 1967.

10943 THE DEVELOPMENT OF VAGAL INNERVATION OF THE BOVINE STOMACH. (E.) McGeady, T. A. (New York State Vet. Coll., Ithaca) and W. O. Sack. Amer. J. Anat. 121(1):121-130, 1967.

10944 AN IMMUNOHISTOCHEMICAL STUDY OF PLASMA CELLS OF HUMAN GASTRIC MUCOSA. (Ger.) Fjellanger, I. (State Hosp., Oslo), P. Brandtzaeg and O. Torgersen. Acta Histochem. (Jena) 27(Suppl. 7):379-382, 1967.

10945 HEPATIC ULTRASTRUCTURE. I. THE NORMAL LIVER. (Fr.)(Rev.) Oudea, P. (Beaujon Hosp., Clichy, France), M. C. Domart-Oudea and R. Fauvert. Rev. France Etud. Clin. Biol. 12(6):527-543, 1967.

10946 CHANGES IN ULTRASTRUCTURE OF EMBRYONIC CHICK LIVER DURING MORPHOGENESIS. (E.) Pollak, J. K. (U. Sydney, Australia) and C. D. Shorey. Aust. J. Exp. Biol. Med. Sci. 45(4):393-405, 1967.

10947 HISTOGENESIS OF THE LIVER IN MAN. (Rus.) Verin, V. K. (Kalinin Med. Inst., USSR). Arkh. Anat. 53(8):90-95, 1967.

10948 HISTOGENESIS OF HUMAN LIVER TISSUE. (Ger.) Verin (Werin), W. K. (Kalinin Med. Inst., USSR). Z. Mikr. Anat. Forsch. 76(4):425-434, 1967.

10949 INTRODUCTION TO THE STUDY OF THE MORPHOGENESIS OF THE LOWER MAXILLARY AND SUBLINGUAL GLANDS IN THE HUMAN EMBRYO. (Fr.) Dozin, A. Leige, Universite Catholique de Louvain [Thesis], 1966, 152 pp.

10950 MORPHOLOGY OF THE "BORDERING" VESSEL OF THE SIGMOID INTESTINE. (Rus.) Golubinskii, V. I. Pp. 371-377 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387 pp.

10951 TOPOGRAPHICAL ANATOMY OF THE SUPERIOR MESENTERIC ARTERY AND VEIN IN THE DOG. (Rus.) Toidze, N. T. (Tomsk Med. Inst., USSR). Eksp. Khir. Anest. 12(4):28-32, 1967.

See also abstract nos.: 11009,11010,11015,11020,11077,11329,11334,11955

10952 AN IMPROVED TURBIDIMETRIC ANALYSIS OF POLYETHYLENE GLYCOL UTILIZING AN EMULSIFIER. (E.) Malawer, S. J. (Walter Reed Army Med. Ctr., Washington, D. C.) and D. W. Powell. Gastroenterology 53(2):250-256, 1967.

Polyethylene glycol is a commonly used indicator substance for studying intestinal absorption. The addition of a water-soluble vegetable gum (gum arabic or gum ghatti) to the reaction mixture of the turbidimetric analysis of polyethylene glycol produced the following: a stable, prolonged peak of max. turbidity which makes precise timing during the determination unnecessary; a linear polyethylene glycol conc. optical-density relationship over a useful range of polyethylene glycol conc; and an accurate and reproducible method of analysis. When gum arabic was present, max. turbidity occurred within 60 min. with a polyethylene glycol range of 200-1000 mg/100/ml. Linearity for this conc. range was obtained with a conc. of gum arabic of 10.0-14.0 mg/liter. The optimum conc. of linearity over the same polyethylene glycol range for gum ghatti was 2.0 mg/liter. The test of reproducibility and recovery was conducted on jejunal perfusions from 4 normal subjects where the coefficient of variation ranged from 0.53%-1.5% and the recovery ranged from 100.0%-101.3%. Centrifugation is indicated when debris conc. is greater than 1%. In vivo perfusion studies of jejunum, ileum, cecum and colon of guinea pigs and rats using this analysis showed no difference in reproducibility between the 2 animals, the different intestinal segments or the 2 emulsifiers used.

10953 STRUCTURAL AND FUNCTIONAL ORGANIZATION OF THE BRUSH BORDER OF INTESTINAL EPITHELIAL CELLS. III. ENZYMIC ACTIVITIES AND CHEMICAL COMPOSITION OF VARIOUS FRACTIONS OF TRIS-DISRUPTED BRUSH BORDERS. (E.) Eichholz, A. (Rutgers Med. Sch., New Brunswick, N. J.). Biochim. Biophys. Acta 135(3):475-482, 1967.

The composition of the subunits of the intestinal brush border of the hamster jejunum was studied. Fractions obtained after Tris disruption and subsequent density-gradient centrifugation were analyzed for their enzyme and chemical content; the fractions included a major membrane component, a minor membrane component, microvillus cores and 2 that were unidentified. The major membrane component fraction contained all of the maltase, invertase, alkaline phosphatase, lactase, isomaltase, trehalase and leucyl naphthylamide hydrolase activities of the brush border, and also contained ATPase. A different ATPase activity was found in 1 of the morphologically identified fractions; this appeared to be associated with a fibrillar material which can be formed from this fraction by appropriate treatment. Lactase activity was occasionally found to be differently distributed from the other disaccharidases, i.e., an appreciable amount appeared in the minor membrane component. No enzymatic activities were found in the fraction composed of microvillus cores. All fractions were analyzed for phospholipid, cholesterol, carbohydrate, protein and DNA; a cholesterol: phospholipid ratio of 1:1 was found in the major membrane fraction.

10954 INTERACTIONS IN THE INTESTINAL HYDROLY AND ABSORPTION OF A FOODMIXTURE. A CONCEPT OF PROXIMAL-DISTAL ABSORPTION GRADIENT. (E.) Ugolev, A. M. (Pavlov Inst. Physiol., Leningrad, USSR), N. N. Jesuitova, N. M. Timofeeva, M. B. Chernjahovskaja and P. De Laey. T. Gastroent. 10(2):152-159, 1967.

The hydrolysis of different test substances (disaccharide, dipeptides and tributyrin) either alone or in combination was studied and compare during incubation with everted intestinal segments taken from white Wistar rats. The initial conc. of the different test substances in Ringer soln. were as follows: 0.2% of a tributyrin emulsion containing 0.01% of sodium deoxycholat 0.3% soln. of dipeptide (glycyl-L-leucine) and 0.25, 0.5 or 1.0% sucrose soln. All incubations were performed at room temperature (22-24°) in metabolic shaker (110 strokes/min.). The hydrolysis rate of the dipeptide was very rapid in the initial reaction stages and showed a typical curved-time correlation. In the presen of 1% sucrose soln. a small and variable intensification of dipeptidase activity was noted. In the presence of tributyrin a significant inhibition of hydrolysis of dipeptide was noted during the entire period of incubation. In the presence of the total test mixture, the inhibit was even more pronounced. Neither the presence of tributyrin nor addition of dipeptide to a 1% soln. of sucrose containing tributyrin had any influence on disaccharidase activity. Hydrolys of tributyrin was slightly activated when the incubation soln. contained 0.3% of dipeptide. There was an inhibition of sucrose hydrolysis a low sucrose conc. (0.25% soln.) in the presence of tributyrin, but this inhibition disappeared when higher conc. of sucrose (0.5 and 1.0%) wer employed. It is suggested that the proximal-distal digestion gradient in the intestine seem to depend much more on the molecular characteristics and conc. of the substrates than on the enzymatic and other activities of the small intestine. Lipids inhibit dipeptide hydrolysis which in turn enhance lipolytic activity. The sequences of hydrolysis and absorption of carbohydrates and peptides is dependent upon their relative conc.

10955 POSTNATAL CHANGES OF ACTIVITY AND ELECTROPHORETIC PATTERN OF JEJUNAL AN ILEAL NONSPECIFIC ESTERASE AND ALKALINE PHOSPHATASE OF THE RAT. EFFECT OF ADRENALECTOMY. (E.) Pelichová, H. (Charles U., Prague),

Koldovský, A. Heringová, V. Jirsová and J.
ml. Canad. J. Biochem. 45(9):1375-1384, 1967.

white Wistar rats the activity of nonspecific
erase (substrate, β-naphthyl acetate) in the
unum and ileum increased during the postnatal
iod of development. Electrophoresis showed
t distribution of this enzyme was different
these 2 parts of the intestine in suckling
s, whereas the zymogram was the same for both
ts in the adult animal. In intact rats, the
ree of inhibition of nonspecific esterase
ivity by 10^{-4} M physostigmine, 5×10^{-6} M
thyl p-nitrophenylphosphate, and 0.4 M NaCl
different, but there were no differences with
1 inhibitor between the jejunum and the ileum
suckling and weanling rats. Adrenalectomy at
ays of age did not influence the activity of
enzyme, but at 14 days of age it inhibited
rise of activity in the jejunum and ileum.
enalectomy influenced the sensitivity of non-
cific esterase activity to inhibition by
sostigmine and diethyl p-nitrophenyl phos-
te. When cortisone was admin. to adrenal-
omized rats, certain characteristics of the
yme (specific activity, sensitivity to various
bitors, zymogram) were, in most cases, com-
ble with those of preparations from normal
rols. The activity of alkaline phosphatase
strate, β-naphthyl phosphate) in the jejunum
ed practically no change during postnatal
lopment, but in the ileum it decreased.
ge in the zymogram was of the same type in
ileum and jejunum. Adrenalectomy at 7 days
ge was followed by a fall in activity in the
m that was apparent at 14 days of age, but
zymogram was not affected. Adrenalectomy on
14 did not produce an apparent change by day
but there was retention of the earlier
trophoretic pattern. When cortisone was
n. to adrenalectomized rats, certain char-
ristics of the enzyme (specific activity,
gram) were comparable with those of prepara-
s from normal controls.

ELECTRICAL POTENTIAL ACROSS THE RAT
SMALL INTESTINE STIMULATED BY ADENOSINE
HOSPHATE. (E.) Kohn, P. G. (U. Sheffield,
and), H. Newey and D. H. Smyth. Nature
don) 215(5108):1395, 1967.

2 adjacent 6-cm sacs from the everted mid-
num, bathed in 30 ml of bicarbonate saline,
electrical potential was recorded across the
of the rat intestine in response to ATP.
tion of 1 mM ATP to the mucosal fluid caused
se in potential after 15 sec., which reached
ak in 60-70 sec. and fell to the original
after approx. 6 min.; the mean potential
ease was 2.85 (±0.20 millivolt), the serosal
being positive. The change was considerably
r than that obtained from addition of trans-
ble hexoses or amino acids. A conc. of 0.1
P caused a potential of 1.6 millivolts, and
0.01 mM ATP produced a potential of 0.6
volts. Addition of adenosine monophosphate or adenosine diphosphate (1 mM) produced a much smaller effect, thereby suggesting that ATP is specific and probably supplies energy for an ionic transport process. The effect of several inhibitors was studied. Phlorhizin (2×10^{-4} M) had no effect on the ability of ATP to stimulate the potential; addition of 2,4-dinitrophenol (2×10^{-4} M) prevented the development of a potential by ATP; ouabain (10^{-3} M) in the serosal fluid caused approx. 50% inhibition of the potential generated by ATP, but had no effect when present in the mucosal fluid. The effect of ionic environment was studied by replacing the NaCl in the bathing fluids by mannitol, choline chloride or KCl; replacement with KCl prevented the potential that is stimulated by ATP, but replacement with mannitol or choline chloride increased the ATP potential to approx. 6 millivolts. In the presence of galactose, ATP caused an increase in potential identical to that in the absence of galactose, e.g., 2 mM galactose gave a potential of 2 millivolts, whereas 2 mM galactose together with 1 mM ATP gave 5 millivolts; in the presence of glucose (2 mM), a smaller increase (1.5 millivolts) was observed when ATP was added. These findings show that ATP in low conc. stimulates the potential across the rat small intestine and are in accord with the action of ATP on a Na pump; these experiments appear to provide the first demonstration that utilization of ATP plays a direct part in the intestinal transfer process.

10957 FATTY ACID ABSORPTION AND METABOLISM IN PROTEIN-CALORIE MALNUTRITION. I. EFFECT OF FAT-FREE AND FAT-CONTAINING DIETS ON FECAL FATTY ACIDS. (E.) Underwood, B. A. (Columbia U., New York, N. Y.), S. A. Hashim and W. H. Sebrell, Jr. Amer. J. Clin. Nutr. 20(3): 226-232, 1967.

Fatty acid absorption was studied in 6 children (3 of each sex; 8-36 mo. old) with protein-calorie malnutrition upon their admission to hospital and at intervals during treatment with a high-protein formula of casein-supplemented skimmed milk containing less than 1 g of fat/day with and without added oil from the day of hospitalization and in 2 children given formula with added oil. The fatty acid composition of the oil was 0.7% myristic acid, 17.8% palmitic acid, 2.6% stearic acid, 37.0% oleic acid, 41.0% linoleic acid and 0.9% unidentified fatty acids. Balance studies were repeated after 9-11 days and after 17-22 days of treatment. Quantitative and gas-liquid chromatographic data obtained from fatty acid analysis of fecal lipids indicated that a significant amount of endogenous fat was excreted, and that this amount was affected very little by feeding diets containing a vegetable oil. Oils in amounts of 33 g/day given at the time of hospitalization did not cause diarrhea or vomiting. Both quantitative and chromatographic data revealed good absorption of p.o.

admin. diets rich in unsaturated fatty acids. In contrast, after nearly 3 wk. of treatment, the level of excreted fatty acids was increased when butterfat was the primary source of dietary fat.

10958 STEATORRHEA IN RATS WITH INTESTINAL DIVERTICULA: EFFECTS OF CHANGING DIETARY DISACCHARIDE AND OF COPROPHAGY. (E.) Hamilton, J. R. (U. Toronto, Canada). *J. Nutr.* 91(4):461-467, 1967.

The creation of a self-filling intestinal diverticulum in rats caused an impairment of fat absorption 4 wk. following surgery, whereas this did not occur in rats which underwent the creation of a self-emptying diverticulum or a sham operation. Initially, the animals were on a diet rich in lactose and then the dietary disaccharide was changed to sucrose which did not alter fat excretion in any group. With sucrose, the total food intake increased. The mean body wt. increased in all groups following the surgery, but mean weight of the group with the self-filling intestinal diverticulum (Group 1) was significantly lower than those in the sham group. The mean value for tail length in this group also was significantly less than either of the other 2 groups. Mean hemoglobin levels were not significantly altered in any group. The postoperative mortality rate in the first group was high with 7 deaths in 16 rats but after this first wk. no deaths occurred in any group. At necropsy, gross abnormalities were confined to the first group: the pouches were enlarged to 2-3 times their original length and diameter and were filled with foul, turbid fluid. In 5 of 9 rats, altered blood was found in the pouches. Microscopically, these pouches had villi that were regular but elongated.

10959 A PLASTIC-CANNULATED INTESTINAL LOOP TO STUDY EFFECTS OF ANESTHESIA ON Ca ABSORPTION. (E.) Cramer, C. F. (U. British Columbia, Vancouver, Canada), S. J. Sadler and R. G. Schulz. *J. Appl. Physiol.* 22(6):1149-1150, 1967.

In order to obviate intestinal intussusception and skin overgrowth, dogs were prepared with intestinal loops perfused with $CaCl_2$ (30 mg Ca/100 ml) made up to 300 milliosmols/liter and which were distinguished by having special nylon cannulae inserted at both ends, which were then brought to the skin surface. This same procedure was repeated and supplemented by admin. of sodium pentobarbitone (30 mg/kg) on the same dogs 4-7 days later. Supplementary barbiturate inj. (6 mg/kg) were also given as required. Of the total of 62 half-hr. measurements made on the conscious dogs, a mean Ca absorption value of 36.4 ± 1.6%/0.5 hr. was observed as compared to a mean value of 43.0 ± 2.5% for anesthetized dogs. Absorption of Ca (mg/0.5 hr.) was 12.8 ± 0.53 and 14.2 ± 0.82 mg/0.5 hr. for conscious and anesthetized dogs, resp. Conscious dogs manifested only a 3.2% standard error as compared to one of 5.8% for anesthetized dogs. These results indicate that barbiturate anesthetization did not depress Ca absorption.

10960 ZINC INTERFERENCE WITH COPPER ABSORPTION IN RATS. (E.) Van Campen, D. R
(US Dept. Agric., Ithaca, N. Y.) and P. U. Scaife. *J. Nutr.* 91(4):473-476, 1967.

An interference in Cu absorption was detected i
Sprague-Dawley rats who were admin. simultaneou
(^{64}Cu tracer, 1.0 μg) and Zn (1.0 mg) in ligate
in vivo segments of the duodenum (approx. 7 cm
in length), whereas in those rats which receive
the tracer Cu by this same route, but the Zn by
i.p. admin. 2 or 18 hr. prior to the admin. of
the ^{64}Cu, the copper absorption was similar to
that of the control animals. Measurements were
made 3 hr. after the admin. of the Cu. Intraduodenal admin. of Zn also tended to decrease t
relative proportion of ^{64}Cu in the liver and to
increase the proportion in the kidneys. There
was also, a significant increase in the serum Z
levels. However, in this case, neither the Zn
nor the Cu levels in the liver, RBC, heart and
kidneys were significantly altered. When the
i.p. admin. of Zn was made at the same time as
the admin. of Cu, the serum level of Zn was
greater than in the controls, but when it was
admin. 2 or 18 hr. prior to the Cu, the serum Z
level was like the controls. These data indica
that Zn does not depress Cu uptake by accumulat
ing in some nonintestinal tissue and, subsequen
interfering with Cu absorption, but, rather, th
impairment is mediated primarily by the direct
effects of Zn either in or on the intestine.

10961 THE EFFECT OF GALACTOSE ON PHENYLALA
TRANSPORT AND ITS DAMAGE TO THE MUCOS
CELLS OF THE RAT INTESTINE. (E.) Casey, M. G.
(U. Med. Clin. Lausanne, Switzerland) and J. P.
Felber. *Gastroenterologia (Basel)* 107(4): 209-215, 1967.

Segments of male Wistar rats intestines incubat
for 1 hr. at 37°C in Krebs bicarbonate-buffer
containing 5 mM of phenylalanine-U-C^{14} in the
presence of 30 mM of galactose showed a signifi
cant reduction of phenylalanine uptake. This
decrease was not seen with 5 mM of galactose.
In addition, preincubation of tissues for 45 mi
in 30 mM galactose followed by incubation with
labeled phenylalanine (with 200 mg glucose/100
caused a reduction in the uptake of phenylalanine as compared to preincubation Krebs
bicarbonate-buffer alone. No reduction occurre
with preincubation in 5 mM galactose. In further experiments it was seen that the presence of galactose increased the rate of phenylalanine release from the tissues. Conversely, the addition of 10 mM phenylalanine
to the incubation medium containing 5 mM galactose showed a decrease in the galactose uptake by the tissues. Additional galactose as well as phenylalanine stimulated the release of labeled galactose from the tissue. Examination of the tissue showed that galactose caused some damage to mucosal cells; nevertheless, these data indicate that a common transport mechanism exists in the intestine for galactose and phenylalanine.

2 ACTION OF L-ALANINE ON THE FLUXES OF
INORGANIC IONS ACROSS THE INTESTINAL
HELIUM OF THE GREEK TORTOISE. (E.)
es-Baillien, M. (U. Liege, Belgium) and E.
ffeniels. Life Sci. 6(12):1257-1262, 1967.

g symmetrical portions of epithelium isolated
the jejunum of the Greek tortoise and mea-
g unidirectional fluxes of Cl with ^{36}Cl, it
hown that a spontaneous potential difference
s between the mucosal and the serosal fluids
his can be abolished by means of an external
romotive force. With Cl, the net flux was
s directed towards the luminal side of the
elium. When L-alanine was added to the
m in the mucosal soln. a decrease, followed
reversal of the flux, always occurred
er the spontaneous potential was or was not
ed by an external source of current. These
suggest a direct relationship between an
e transport of L-alanine and the active
port of Cl ions. Such reproducible results
not obtained when L-alanine was added to
ystem in the presence of either Na- or K-
s. In both cases the results were too
ble to be conclusive, but it would seem that
nine has no effect on K-fluxes.

MILK PROTEIN PERMEABILITY OF THE
INFANTILE INTESTINE FROM THE ASPECT OF
ODY REACTION. (E.) Kodama, T. (Wakayama
Coll., Japan) and K. Hiroi. Acta Paediat.
[Overseas] 8(16):29-39, 1966.

ody to cow's milk in the blood of infants
etermined using the tannic acid-treated
gglutination method; the highest level was
in infants given a completely artificial
ng. Antibody positives were higher in the
in which cow's milk or cow's milk prepara-
was begun before the fifteenth day after
, compared to those given artificial feed-
fter the fifteenth day. The high positive
ody rate present in the group in which
icial feeding was begun before 15 days of
as attributed to 2 factors, namely, the
tibility of cow's milk protein and the
ability of the intestinal wall at this
of life. Determination of the antibody
ding to each protein fraction revealed the
st rate for α-casein, while the antibody
st α-lactalbumin and β-lactoglobulin was
When α-casein was admin. p.o. in the rat,
ody was found only in the animals given
ein in the newborn stage; it was not
ved when given at later stages.

DIFFERENCES IN THE MECHANISM OF
INTESTINAL ABSORPTION OF CARDIOTONIC
IDS AND OTHER DRUGS. (Ger.) Lauterbach, F.
us Biol. Inst., Cologne, Germany), C.
, D. Nitz and K. Prescher. Naunyn
edeberg Arch. Pharm. Exp. Path. 257(4):
57, 1967.

Isolated rat intestinal loops about 30 cm long (beginning 5 cm beyond the pylorus) were perfused with 40 ml of a modified Krebs-Ringer soln. at 37.5°C; perfusion duration was 45 or 90 min. The cardiotonic steroids and other compounds tested were added to the perfusion fluid; when compounds with low solubilities in H_2O were studied, the perfusion fluid contained 4% ethanol by vol. During a trial the intestinal loop was placed either in a moist chamber or in a 60-ml bath containing the same Krebs-Ringer soln. as the perfusion fluid (without the compound under test). The entire system was oxygenated. Altogether the absorption of 6 cardiotonic steroids and 3 other drugs in several conc. was measured; the amounts of absorbed drug were determined from the fluid absorbed or in the soln. bathing the loop checked against the amount in the wall of the loop and that in the perfusate. The absorption rates were calculated from these values. With increasing drug conc. in the perfusate: 1) The absorption rates of hydrocortisone and lysergic acid diethylamide remained constant and the absorption rate of quinine increased only slightly; 2) the absorption rate of digitoxin increased and although the amount was small (statistically not significant), the increment was present under all experimental conditions; 3) the absorption rates of strophanthidin, ouabain, deslanoside, convallatoxol, and convallatoxin decreased. The decreased absorption rate of convallatoxin was more marked with greater conc. of the compound in the perfusate; when the glycoside was increased 40-fold, the absorption rate fell to 5% of its original value. Bathing the loop instead of using the moist chamber doubled the absorption rates of bath hydrocortisone and convallatoxin. The absorption of hydrocortisone was not influenced by convallatoxin but the absorption of convallatoxin was inhibited by hydrocortisone. Polar cardiotonic steroids seem to be mainly absorbed by a transport system which presents the kinetics of saturation. An absorption by diffusion probably occurs only when the condition of the intestinal wall and the experiment are not optimal.

10965 INFLUENCE OF Na+ ON THE INTESTINAL ABSORPTION OF THE CARDIAC GLYCOSIDE CONVALLATOXIN. (Ger.) Lauterbach, F. (Madaus Biol. Inst., Cologne, Germany), C. Gerber, D. Nitz and K. Prescher. Naunyn Schmiedeberg Arch. Pharm. Exp. Path. 257(4):458-473, 1967.

Isolated rat intestinal loops were used to study the interaction of Na, H_2O, and convallatoxin and also glucose and hydrocortisone during absorption as the loops were perfused with soln. of different Na conc. The av. values for the Na and H_2O absorbed increased continuously when the Na levels of the perfusate were elevated. The av. amount of hydrocortisone absorbed was raised by elevating the Na of the perfusate; the increased amount of hydrocortisone absorbed was proportional to the increased amount of H_2O simultaneously absorbed; its conc. in the absorbed fluid and the ratio of hydrocortisone absorbed to Na absorbed remained constant. Unlike hydrocortisone the av. amount of absorbed glucose and of convallatoxin lagged behind the increasing absorption of H_2O and Na. Therefore at high Na conc. in the perfusate, the conc. of both glucose and convallatoxin in the absorbed fluid and the ratios of the absorbed amounts of glucose to absorbed Na and of convallatoxin to Na, resp., were smaller than the corresponding values obtained in experiments with low Na conc. in the perfusate. The Na-dependent absorption of convallatoxin was the same as that previously described for the Na-dependent absorption of glucose. The regression coefficient decreased with increasing Na conc. of the perfusion soln. The relative absorption rate of convallatoxin decreased with higher conc. of the glycoside in the perfusate; this effect occurred at a Na conc. as low as 10 mM. The similar dependence of the absorption of glucose and convallatoxin indicates that cardiosteroids can be absorbed by a transport mechanism.

10966 ACTION OF CARDIAC GLYCOSIDES UPON THE ISOLATED SMALL INTESTINE. (Ger.) Forth, W. (U. Saarland, Homburg/Saar, Germany) and W. Rummel. *Helv. Physiol. Pharmacol. Acta* 25(1):8-23, 1967.

Guinea pig jejunal segments (8 cm long) were perfused for 2 hr. with oxygenated Tyrode soln. containing the drug to be tested; the preparations were maintained in a moist chamber at 37°C. The fluid absorbed through the wall of the loop was collected from the bottom of the chamber. In another series everted-sac preparations (5-cm long) were made from jejunal segments, tied at both ends, inj. with Tyrode soln. (serosal side) and placed in 10 ml of Tyrode soln. under 1.5 atmospheres pressure of 95% O_2 and 5% CO_2, at 37°C for 2 hr.; after this the glucose conc. was determined in the serosal fluid. The effects of digitoxin, ouabain and proscillaridin (glycoside from bulbus *Scillae*) on Ca, Na, and Cl ions, H_2O and glucose absorption were studied; all 3 glycosides inhibited the absorption of Ca, glucose, Na and H_2O. The degree of inhibition by the particular glycoside varied in different jejunal regions; using equimolar conc. of glycosides, in the distal jejunal segment the inhibition was double that in the proximal segment. The transport processes were not influenced to the same extent; in the proximal segment a reduction of about 50% in glucose absorption occurred with digitoxin of 1×10^{-5} M, of 5×10^{-5} M and with proscillaridin of 5×10^{-6} M. Na and H_2O were not affected at these conc., but at these conc. digitoxin and proscillaridin reduced Ca as well as glucose absorption. Using the everted-sac preparation, the transport of glucose was inhibited by proscillaridin and ouabain whether the glycoside was added on the mucosal or on the serosal side; the threshold conc. for ouabain on the serosal side (5×10^{-6} M) being smaller than the equally effective dose on the mucosal side. The situation was reversed with proscillaridin where the mucosal side was more sensitive; digitoxin was also more effective on the mucosal side. It is suggested that the different behavior of the cardiac glycoside is caused by differences in polarity and in their affinity for proteins.

10967 EFFECT OF COMPLEX FORMATION ON DRUG ABSORPTION. IV. ROLE OF INTRAGASTRI DIFFUSION IN THE ABSORPTION OF FREE AND CAFFEIN COMPLEXED SALICYLIC ACID FROM THE RAT STOMACH. (E.) Reuning, R. H. (State U. of New York, Buffalo) and G. Levy. *J. Pharm. Sci.* 56(7): 843-847, 1967.

Gastric absorption of salicylic acid complexed with caffeine was evaluated in rats under conditions in which the complex soln. was eithe stirred or left unstirred in the stomach. Stirring was effected by either employing a static stirrer in which the implanted microstirrer was not rotated during the absorption period or a rotating stirrer in which stirring was started 5-7 min. after salicylic acid inj. and maintained during the rest of the 1-hr. absorption period. The stomach along with the residual drug soln. was removed after the absorption period. The stomach and its content were homogenized and analyzed for unabsorbed salicylic acid. The overall absorption rate of salicylic acid was reduced uniformly under both conditions of stirring and also for nonstirring tests. In addition, stirring had no appreciabl effect on the absorption rate of free salicylic acid, salicylic acid complex or for ethanol. These findings indicate that under these experimental conditions, the diffusion of neith free salicylic acid nor salicylic acid complex in the absorption of salicylic acid is rate-limited. It is probable that the observed decreased absorption of salicylic acid is the result of a reduced thermodynamic activity of salicylic acid brought about by its complexing with the caffeine.

10968 VITAMIN B_{12} ABSORPTION STUDIES---THE EFFECT OF CARBACHOL AND GASTRIN ON TH ^{57}CO-LABELLED VITAMIN B_{12} PLASMA LEVEL ABSORPTI TEST IN PATIENTS WITH PERNICIOUS ANAEMIA. (E.) Armstrong, B. K. (Roy. Perth Hosp., Australia) and H. J. Woodliff. *Med. J. Aust.* 1(16):819-82 1967.

Vitamin B_{12} absorption in each of 12 patients with pernicious anemia was studied on 3 occasio by the use of unstimulated, carbachol-stimulate (a dose of 0.25 mg of carbechol admin. i.m. 30 min. before the test) and gastrin-stimulated (135 U [µg] of gastrin admin. i.m. 30 min. before the test) ^{57}Co-labeled vitamin B_{12} plasma level tests. After an overnight fast, the vitamin B_{12} absorption test was begun with a p.o. dose of 0.8 µg of ^{57}Co-labeled cyanocobalamin; 6 hr. later 1000 µg of unlabeled hydroxocobalamin was admin. i.m., and 2 hr.

this blood was drawn for counting of the
activity in the plasma. Levels of less than
of the dose/liter were considered indica-
of malabsorption of vitamin B_{12}, those
er than 0.65% were indicative of normal
ption and those from 0.45%-0.65% were
dered equivocal. Only 2 anomalous (equivocal)
ts occurred. The results indicated that
er carbachol nor gastrin had a significant
t on vitamin B_{12} absorption as assessed by
test.

FURTHER STUDIES ON THE MECHANISM OF
ABSORPTION OF VITAMIN A AND CHOLESTEROL.
David, J. S. K. (Indian Inst. Sci.,
lore) and J. Ganguly. Indian J. Biochem.
14-17, 1967.

a 24-hr. starvation period, normal male al-
rats were given p.o. 7.7 μmoles of 4-^{14}C-
sterol ester containing 50,000 counts/min.,
.5 μmoles of retinyl acetate, each compound
dissolved in 0.5 ml of peanut oil. Almost
f the cholesterol ester hydrolase of the
tinal mucosa of these rats was found in the
border, while the nonparticulate super-
t fraction contained appreciable quantities
e cholesterol ester synthetase activity.
er, the retinyl ester hydrolase and syn-
se activities were distributed in all of the
fractions, with the brush border containing
ajor portion of the hydrolase and the non-
culate supernatant fraction more of the
etase activity. On separation of the intes-
contents of rats given 4- ^{14}C-cholesterol
e or retinyl acetate into the micellar and
hases, the micellar phase contained only
erified cholesterol, and the fat phase both
ified and unesterified sterol. Retinyl
s and retinol, on the other hand, were
ibuted in both fat and micellar phases, with
at phase containing higher amounts of retinyl
s and the micellar phase more of retinol.
retinyl acetate was fed, the brush border
contained cholesterol esters. In contrast,
retinyl acetate was fed, the brush border
ined only the acetate at 30 min., and both
cetate and higher esters at 120 min., while
onparticulate fraction of the cell contained
the higher esters of retinol at both the
intervals.

THE EFFECT OF LITHIUM ON INTESTINAL
SUGAR TRANSPORT. (E.) Bihler, I. (U.
oba, Winnipeg, Canada) and S. Adamic.
im. Biophys. Acta 135(3):466-474, 1967.

uptake of hamster small intestine *in vitro*
easured with various replacements for Na in
edium. The basic incubation medium con-
d of 120 mM NaCl buffered with 25 mM Tris
ide-bicarbonate (pH 7.4) and contained, in
ion, the same conc. of K, Ca, Mg, SO_4 and
s the original Krebs-Henseleit bicarbonate
r with which it was isosmotic; modified media were prepared by replacing the NaCl with isosmotic amounts of LiCl, KCl, choline chloride or mannitol, which are subsequently referred to as Li, K, choline and mannitol media, resp. None of the various replacements for Na supported transport against a conc. difference, but sugar equilibration was significantly more rapid in the presence of Li than of mannitol, choline or K. This stimulatory effect of Li was inhibited by 0.5 mM phlorhizin and was observed with 3-O-methyl-D-glucose, D-galactose and α-methyl-D-glucoside, which are all actively transported in the presence of Na, but not with L-fucose and L-arabinose. Mutual inhibition between 3-O-methyl-D-glucose and D-galactose was observed in Li medium, but not in mannitol medium. Li had no effect on the entry of α-aminoisobutyric acid. It is suggested that Li stimulates sugar entry by activating the sugar "carrier" and not by interacting with the Na pump. These results are consistent with the hypothesis of Crane *et al.* that intestinal sugar active transport is mediated by an ion-activated carrier.

10971 D-XYLOSE: ACTIVE INTESTINAL TRANSPORT IN A SODIUM ION SUBSTITUTED LITHIUM MEDIUM. (E.) Faust, R. G. (U. North Carolina Sch. Med., Chapel Hill), J. W. Hollifield and M. G. Leadbetter. Nature (London) 215(5107): 1297-1298, 1967.

Using fed male Sprague-Dawley rats, cannulated everted sacs of jejunum were filled and incubated at 37°C for 1 hr. in 100 ml of gassed (O_2:CO_2, 95:5) Na, Li or K bicarbonate saline soln., at pH 7.4, containing 6.66 mmoles of either D-xylose, D-ribose, L-arabinose or D-arabinose; when Na was replaced, equal molarities of either Li or K were used. Using this method, the final conc. of D-xylose within the mucosa in the presence of Na was almost twice as great as the initial conc. in the incubation medium; the other pentoses had a final mucosal tissue conc. that was similar to the initial medium conc. of 6.66 mmoles. In a $LiHCO_3$ saline medium, D-xylose was also actively transported; no change was observed with the other pentoses. The active transport of D-xylose was not evident when K was substituted for Na. Additional experiments were done in order to compare the active transport of D-xylose in $NaHCO_3$ and $LiHCO_3$ saline, using various inhibitors. Active D-xylose transport in both the Na and Li media was inhibited by phlorhizin, iodoacetic acid and NaF, and 2,4-nitrophenol; oligomycin, an inhibitor of oxidative phosphorylation, was very effective in inhibiting active D-xylose transport in the presence of Na, but was not nearly as effective when Na was replaced by Li. These findings illustrate that the mechanism of active D-xylose transport by mucosa from rat jejunum is similar in either $NaHCO_3$ or $LiHCO_3$ saline. In addition, the energy requirements for this process are similar to those observed for the active intestinal transport of other sugars. The fact that Li can replace Na in the incubation medium is the only apparent difference in the mechanism of active transport of this pentose and other sugars.

10972 THE EFFECT OF DIFFERENT HYDROGEN ION CONCENTRATIONS UPON GLUCOSE ABSORPTION.

(Ger.) Förster, H. (U. Munich, Germany), W. Erdlenbruch and H. Mehnert. Z. Ges. Exp. Med. 144(1):14-23, 1967.

A cannula was inserted into the duodenum from the stomach and a plastic tube inserted into the ileum 2 cm above the cecum in fasted male rats. The small intestine was perfused with 60 ml of fluid which entered the duodenum and left the ileum at a rate of flow of 0.9 ml/min. produced by a roller pump. Polyvinylpyrrolidone (2%) was added to the perfusate to serve as a marker for absorption. The different pH values of polyvinylpyrrolidone and glucose-containing perfusion fluid were obtained by the addition of 2 N HCl or 2 N NaOH. In some tests buffer soln. of glycine and $NaHCO_3$ were used, in others the osmotic pressure was changed with 0.33 M NaCl. After perfusion, segments of the proximal small intestine from 10 animals were prepared for histology. The changes of pH were neutralized by intestinal secretions even when the change resulted from the addition of a buffer pair; only at extreme values did neutralization not occur. The absorption of a 1% glucose soln. hardly varied in a pH range from 3-9.5. Absorption was inhibited only beyond these extremes with visible macroscopic and microscopic structural alterations of the mucosa. In particular the passive uptake of glucose is reduced as H_2O absorption is also reduced. The active component in glucose transport seems relatively insensitive to pH changes.

10973 STUDIES ON TRANSMURAL POTENTIALS IN VITRO IN RELATION TO INTESTINAL ABSORPTION.

IV. PHLORIZIN-SUGAR INTERACTIONS IN RAT GUT.

(E.) Lyon, I. (Chicago Med. Sch., Ill.). Biochim. Biophys. Acta 135(3):496-506, 1967.

A simple and sensitive system is described for measurement of short-circuit current across the wall of everted sacs of rat small intestine. With this system, phlorhizin-dependent changes in current, and in transmural potential, were measured and appeared to be saturable functions of the phlorhizin conc. in the medium. These changes in short-circuit current and potential difference, by analogy was similar saturation effects upon changes in current and transmural potential induced by actively transported sugars, may be interpreted in terms of an interaction of Na and phlorizin with a mobile carrier in the brush border membrane of the intestinal epithelial cell. By extrapolation from plots of the reciprocal of the transmural potential or the reciprocal of the changes in current against the reciprocal of the phlorhizin or sugar conc., apparent Michaelis constant and inhibitor constant values for phlorhizin, the latter determined against glucose and several of its analogs, were estimated. The differential effects of t
Na conc. in the medium upon the apparent Michaelis constant and inhibitory constant values suggest that phlorhizin may enter the cell by 2 modes of interaction with the carrie
1 mode of entry, specified by inhibitor consta
values, is Na-sensitive and may be the consequ
of interactions of glucose moiety with the sugar-binding site of the carrier; the other mode of entry, specified by Michaelis constant
values, is relatively Na-insensitive, and may
depend upon interactions between the carrier a
the aglycone moiety of phlorhizin. The ratio
apparent Michaelis constant for a given sugar
the apparent inhibitor constant of phlorhizin against that sugar remained essentially unchan
irrespective of the Na conc. In addition, Michaelis constant/inhibitor constant ratios f
2 or more structurally-related sugars seem to allow for sharper discrimination between their
affinities for the carrier than can be inferre
from sugar apparent Michaelis constant values alone.

10974 HYPOTHESIS FOR THE INTERACTION OF PHLORIZIN AND PHLORETIN WITH MEMBRAN

CARRIERS FOR SUGARS. (E.) Alvarado, F. (Rutg
Med. Sch., N. J.). Biochim. Biophys. Acta 135(3):483-495, 1967.

Using 6-deoxy-D-glucose and D-xylose as substrates, it was found that phlorhizin, but not
its aglycon, phloretin, is a fully competitive
inhibitor of sugar active transport in the ham
ster small intestine. The results indicated that 1) phlorhizin competes with glucose and i
analogs for a common membrane binding site; an
2) phloretin inhibits sugar transport alloster
cally through binding to a different, but closely associated, binding site. In order to
explain these findings, a kinetic model was co
structed in which the carrier is assumed to possess 2 different sites, namely a sugar- and a phenol-binding site. Phlorhizin binds simultaneously to both of these sites. The synergistic effect of this double binding causes the overall affinity of phlorhizin for the sugar carrier to be 3-4 orders of magnitud
higher than that of the physiological substrat
glucose. Phloretin binds only to the phenol s
The differences among tissues in their relativ
responses to phlorhizin and phloretin are attributed to differing spatial relationships between the sugar site and the phenol site.

10975 EFFECTS OF DIETARY IRON LEVEL ON GUT IRON LEVELS AND IRON ABSORPTION IN T

RAT. (E.) Pearson, W. N. (Vanderbilt U. Med. Sch., Nashville, Tenn.), M. Reich, H. Frank and
L. Salamat. J. Nutr. 92(1):53-65, 1967.

The hypothesis that the Fe content of the intestine is of critical importance in determi
ing the rate of Fe absorption was investigated in Sprague-Dawley rats. The Fe content of the

RPTION
ntestine was found to vary with the Fe con-
of the diet, but the relationship was not
r. The more proximal sections of the intes-
were more sensitive to dietary Fe level
the distal portions. Rats fed stock rations
uch lower proximal intestinal Fe levels
rats fed purified diets of lower Fe content.
e content of the intestine appeared to
ence, within limits, the absorption of ^{59}Fe
an isolated intestinal loop. When rats
changed from a high Fe diet to a low Fe
a steady depletion of Fe from the intestine
ccompanied by an increase of Fe absorption
was max. on the third-to-fifth day after
hange of diet. In the reverse experiment,
sorption was almost immediately depressed
mitant with the elevation of the intestinal
vel. The Fe content of the mucosa did not
r to influence the entrance of the test dose
into the mucosa; instead, the major point
cosal regulation appeared to be the transfer
from the mucosa to the blood supply.
re of a large dose of Fe placed in the
um to influence immediately the absorption
Fe from a duodenal loop indicates that
mucosal (possibly hormonal) control of Fe
ption is lacking or minimal.

EFFECT OF STARVATION AND PROTEIN
DEPLETION ON FERROKINETICS AND IRON
PTION. (E.) Conrad, M. E. (Walter Reed
Inst. Res., Washington, D. C.), A. L. Foy,
Williams and W. H. Knospe. Amer. J. Physiol.
):557-565, 1967.

ation and protein-deficient diets caused
ased absorption of Fe in male albino rats.
vations at intervals after onset of fasting
n rats fed various quantities of protein
sted that the changes in Fe metabolism were
o depressed erythropoiesis and retarded
h. The protein-deficient diets were similar
e food consumed by "starch eaters" and
itants of rice-eating countries (except that
contained adequate amounts of added Fe);
diets caused a normocytic, normochromic
a, with decreased absorption which was
ed to diminished erythropoiesis and not to
luminal intestinal factors. The rats tried
-establish and maintain a normal body conc.
by decreased absorption and increased excre-
of Fe; the decreased Fe absorption was not
panied by an increased Fe content or conc.
e duodenal mucosa. In starved animals, how-
increased amounts of dialyzable Fe was
porated into the duodenum from body stores.
ugh the total quantity of Fe in the intes-
mucosa may be unimportant, it is suggested
the source and chemical form of Fe may be
nificant factor in the regulation of Fe
ption.

IRON CONTENT OF DUODENOJEJUNAL VILLI.
IRON ABSORPTION FROM THE VIEWPOINT OF
LOGY. (Fr.) Cattan, D. (Bichat Hosp., Paris),
C. Marche, G. P. Jori and C. Debray. Nouv. Rev. Franc. Hemat. 7(2):259-270, 1967.

In 9 men and 1 woman biopsies were taken of the gastric, duodenal, and jejunal mucosa and puncture biopsy of the liver, before and after p.o. admin. of Fe. Tissues were prepared for histology and sections were stained with Prussian blue for Fe determination. The Fe deposited in the apical cells, varied from villus to villus and was quite unequal in adjacent cells. The general epithelial cells contained only minute amounts of Fe and seemed incapable of the rapid uptake and transport of Fe from normal p.o. doses. The macrophages, subepithelial, pericapillary, and in the corium, had the greatest local store of Fe. These cells are in constant interchange of p.o. Fe from the apical cells, plasma Fe, and Fe from hemoglobin. It has been proved by radioactive Fe that RBC are destroyed in the intestinal mucosa; the radioactivity was found in the macrophages. The greater the amount of Fe stored in macrophages, the less p.o. Fe absorbed in the intestine. It is thought that macrophages release Fe directly into the plasma as do other cells of the reticuloendothelial system.

10978 EXPERIMENTAL STUDIES ON THE INFLUENCE OF CHRONIC ALCOHOL INGESTION ON ABSORPTION OF IRON IN THE SMALL INTESTINE OF RATS IN VITRO. (Pol.) Hoszowska-Owczarkowa, H. (Inst. Pharmacol., Acad. Med., Szczecin, Poland), L. Samochowiec and J. Wójcicki. Acta Physiol. Pol. 17(3):435-439, 1967.

Experimental alcoholism in white rats did not influence the absorption of ferrous gluconate in the small intestine according to in vitro studies conducted by a modified Wiseman method. The mean absorption of Fe by the small intestine from 11 controls was 71.78 µg with a mean deviation of 13.53 µg, whereas the absorption by the small intestine from the alcoholic rats was 67.04 µg, with a mean deviation of 18.93 µg. In contrast, the in vitro absorption by the small intestine of nutrient fluid was retarded in the alcohol-treated animals where the absorption was 0.9 ml (mean deviation, 0.57 ml) as compared to 2.3 ml (mean deivation 0.88 ml) with the control rats.

10979 LARGE AND SMALL DOSES OF ASCORBIC ACID IN THE ABSORPTION OF FERROUS IRON. (E.) Lee, P. C. (Mayo Clin., Rochester, Minn.), J. R. Ledwich and D. C. Smith. Canad. Med. Ass. J. 97(4):181-184, 1967.

Absorption of ferrous Fe was studied in 40 fasting, nonanemic subjects (22 men, 18 women; 19-80 yr. old.); none were under treatment for Fe deficiency and none had hemoglobin values below 75% (11.0 g/100 ml). Three procedures were used. In the first, after obtaining blood for an initial serum Fe determination, 200 mg, p.o. ferrous sulfate, was admin.; then 4 serum Fe estimations using the Ramsay method were made at hourly intervals. The method of study used in the other 2 procedures was similar to the first, except that in the second 50 mg of ascorbic acid was admin. with the ferrous sulfate and in the third, 1 g of ascorbic acid was admin. with the ferrous sulfate. The procedures were performed at 4-day intervals in each subject, and their sequence was randomized. No significant differences were found between the first 2 procedures. Higher elevations in serum Fe were found when ferrous sulfate was admin. with 1 g of ascorbic acid, suggesting that this dose, but not a dose of 50 mg, significantly enhances the absorption of ferrous sulfate.

10980 THE RELATIONSHIP BETWEEN DUODENAL MUCOSAL IRON CONCENTRATION AND IRON ABSORPTION IN HUMAN SUBJECTS. (E.) Allgood, J. W. (Washington U. Sch. Med., St. Louis, Mo.) and E. B. Brown. Scand. J. Haemat. 4(3):217-229, 1967.

Non-heme Fe conc. of duodenal mucosa obtained by peroral capsule biospy were determined in normal, Fe-deficient and Fe-overloaded human subjects. Intestinal Fe conc. of normal subjects did not differ significantly from those of the Fe-deficient or Fe-overloaded subjects. No significant variation was detected in Fe conc. of mucosa obtained from various anatomical segments of duodenum removed at autopsy. Intestinal non-heme Fe conc. showed no significant correlation with simultaneous measurements of serum Fe conc. nor with radio-Fe absorption in a group of 25 patients (including normal, Fe-deficient and Fe-overloaded subjects). Radio-Fe absorption was correlated significantly with the severity of anemia, but not with serum Fe conc. or percentage transferrin saturation. Failure to confirm prior studies in animals indicates that species differences exist in the regulation of gastrointestinal Fe absorption and underscores the need for additional studies of the control Fe absorption in man.

10981 COMPARISON BETWEEN THREE RADIOISOTOPE METHODS FOR MEASURING IRON ABSORPTION. (E.) Lunn, J. A. (Roy. Infirm., Edinburgh, Scotland), J. Richmond, J. D. Simpson, J. D. Leask and P. Tothill. Brit. Med. J. 3(5561):331-333, 1967.

A simple inexpensive whole-body counting technic for Fe absorption in which radioactivity was measured in 3 positions with the patient prone and supine is described. This method, together with the "fecal recovery" and double-isotope methods of determining Fe absorption, were compared over a wide range of hemoglobin level, serum Fe and stainable marrow Fe in 17 patients. Using the first method, only 2 measurements on the patient were required, each taking approx. 15 min. This method gave results which correlated well with the double isotope method
in 16 patients who showed a wide range of hemc
globin level, serum Fe and stainable marrow Fe
Although a good correlation was obtained in th
whole-body counting method between the lying a
sitting positions, the estimate of absorption
for the sitting posture was much higher than f
the lying position in 4 patients and exceeded
100% in 2. The poorer agreement in the sittir
position was presumably due to redistribution
effects. The fecal recovery method of Fe
absorption, which was used simultaneously,
showed poor agreement with the whole-body coun
ing and double isotope technics; this discrepa
is believed to have been due to incomplete stc
collections.

10982 THE EFFECT OF TRYPSIN, CHYMOTRYPSINO
CHYMOTRYPSIN AND AMYLASE ON IRON
ABSORPTION. (Ger.) Dietze, F. (U. Clin.,
Berlin), G. Brüschke, A. Rückert, F. H. Schulz
I. Stokov and S. Wuttke. Deutsch. Gesundh.
22(28):1304-1305, 1967.

These crystallized trypsin, chymotrypsinogen,
chymotrypsin and amylase (6 Kunitz U/mg) were
used in various p.o. dosages (2-8 mg/kg) to
study their effect upon the absorption of ferr
iron (1.5 mg/kg p.o.) taken without enzyme or
followed in 5 min. by an enzyme. Serum Fe con
was determined each hr. for 3 hr. After 3 hr.
the normal range of serum Fe was 250-320 µg% a
290 µg%; with 2 mg trypsin/kg serum Fe was
220 µg%; 4 mg trypsin/kg, serum Fe 195 µg%; 8
trypsin/kg, 160 µg% of serum Fe. Chymotrypsinogen, 2 mg/kg, reduced serum Fe to 200 µg%
and 4 mg/kg to 115 µg%. The reduction of seru
Fe was somewhat less with chymotrypsin which,
a dose of 8 mg/kg, reduced serum Fe after 3 hr
to 115 µg%. These reductions below the normal
values were clearly due to inhibited absorptio
Amylase had no effect on the absorption of Fe.

10983 BICARBONATE-INDUCED IRON COMPLEXES A
IRON ABSORPTION: ONE EFFECT OF
PANCREATIC SECRETIONS. (E.) Bemjamin, B. I.
(Walter Reed Army Inst. Res., Washington, D. C
S. Cortell and M. E. Conrad. Gastroenterology
53(3):389-396, 1967.

Male guinea pigs were fed a standard laborator
diet containing 12 mg of Fe/100 g dry wt.; 1 group of animals were made Fe-deficient by repeated phlebotomies and a second group was Fe-loaded by i.m. inj. of dextran-Fe. Fe absorption studies were done on these animals,
as well as on animals that received secretin,
or 25 Crick U i.p., to stimulate pancreatic bicarbonate secretion. The effect of dilute (0.015 M) and conc. (0.5 M) $NaHCO_3$ on Fe absor
tion was studied. Addition of $NaHCO_3$ to Fe soln. produced both soluble macromolecular Fe chelates and Fe precipitates, and caused decreased absorption of test doses of Fe by normal guinea pigs. Similar physicochemical changes occurred when Fe soln. were added to

enal secretions. Likewise, inj. of normal
als with secretin reduced Fe absorption.
e findings suggest that decreased secretion
icarbonate by the pancreas in the various
romes of pancreatic insufficiency may be
rtant in causing increased absorption of Fe.
s unlikely that this phenomenon causes
ve Fe overloading because bicarbonate did
significantly affect Fe absorption by Fe-
ed or Fe-deficient animals.

EFFECT OF PANCREAS EXTRACT ON Fe^{59}
ABSORPTION BY ANEMIC RATS. (E.)
y, M. J. (U. Minnesota, Minneapolis) and
ein. J. Lab. Clin. Med. 70(3):361-364,

e Sprague-Dawley rats (47) were made anemic
eding an Fe-free evaporated milk with
in supplements, deionized water and a
ement of 18.2 ppm of Cu as a copper sulfate
(used to avoid Cu deficiency); in addition,
were bled from a tail vein at a rate of
wk. for 6 wk. At the end of this period,
rat was given a p.o. test dose of 0.25 μc of
ferrous citrate with 0.25 mg of ferrous
te as carrier in a total vol. of 0.7 ml.
nemic rats were then divided into 3 groups:
1, the control anemic group, was fed
rated milk; Group 2 was fed undiluted pancreas
r, 2 g/rat/day, mixed with evaporated milk;
roup 3 was fed bromelain 2 g/rat/day in
ilk (bromelain was used as a control en-
. The absorption of ^{59}Fe was studied be-
and after the feeding of pancreas extract
romelain. No significant depression of Fe
ption resulted from feeding pancreas powder,
here was a significant depression in rats
he control substance, bromelain. These
ts do not support previous suggestions that
eatic extract specifically depresses the
ption of Fe. The effect of bromelain was
triking in spite of its significance,
sting that this was most likely a nonspecific
t caused by weak binding with the metal.

INTESTINAL SPLITTING OF OLIGOSAC-
CHARIDES. (Ger.) Täufel, K. (Inst.
, Potsdam-Rehbrucke, Germany), W. Krause,
ttloff and R. Maune. Z. Ges. Exp. Med.
):54-66, 1967.

ed 10-cm sacs of the rat small intestine,
d with balanced physiological saline, tied,
eighed were placed in a definite vol. of
ced physiological saline (containing the
to be tested). The sugar in the outer
was determined at the beginning of a 1-hr.
and again at the end of this period when
was also determined in the fluid within the
Sugar, introduced in soln. *in vivo* into
tinal loops with intact circulation, was
mined in the portal blood, and sugar soln.
ated into the intact animal was determined
e urine. The activities of α-amylase,
dextranase, and α-glucosidase in the intestinal segments were established. Analysis of the saccharides was by quantitative paper chromatography. Different oligosaccharides (maltose, sucrose, a mixture of malto-oligosaccharides, a mixture of isomalto-oligosaccharides, lactose, lactulose, raffinose, stachyose and verbascose) were tested with respect to their absorption as intact components, and in terms of intestinal carbohydrase activity. Nonhydrolyzed sugars passed through the intestinal wall in increasing amounts as the enzyme activity of the segment decreased; the amount of sugar passing was extremely small. After p.o. or i.p. admin. the tested oligosaccharides (except maltose and malto-oligosaccharides) were found in the serum of the portal vein and in the urine in small quantities; this supports the *in vitro* studies. The passage seems to be an inverse function of molecular size. The liver and kidney of the rat have extremely low or no carbohydrase activity; consequently, sugars which are absorbed unchanged are excreted unchanged in the urine.

10986 EFFECT OF PEPSIN ON THE ABSORPTION OF FOOD VITAMIN B$_{12}$ AND IRON. (E.) Schade, S. G. (U. Wisconsin Med. Sch., Madison) and R. F. Schilling. Amer. J. Clin. Nutr. 20(6):636-640, 1967.

In vitro peptic digestion did not alter the absorption of egg vitamin B$_{12}$ or Fe in 10 patients with pernicious anemia. Following ingestion of eggs from chickens which had been inj. with B$_{12}$, Co^{57} and ^{59}Fe, the mean of B$_{12}$ excretion in the stool of pernicious anemia patients was 76% with pepsin-treated eggs (addition of 1 g of pepsin to egg homogenate) and 81% with nonpepsin-treated eggs. The difference between these 2 means is only significant at the 0.15 level of probability, however, the mean excretion of B$_{12}$ in the control patients was 61% which is significantly different in both groups. The mean of ^{59}Fe excretion in pernicious anemia patients with pepsin-treated eggs was 89% and with non-pepsin-treated eggs, 86%. The mean excretion in the control patients was 88%. Studies made on the dialyzability of egg B$_{12}$ and Fe showed that pepsin releases B$_{12}$ for dialysis, whereas it had little effect on the dialyzability of Fe. This would indicate that the peptic treatment of the eggs enhanced the dialyzability of B$_{12}$, thus increasing the absorption somewhat.

10987 SOLUBILIZATION OF SUGARS IN NON-POLAR SOLVENT BY INTESTINAL LIPIDS: POSSIBLE RELATION TO MEMBRANE TRANSPORT. (E.) Baker, R. D. (U. Texas Med. Branch, Galveston). Texas Rep. Biol. Med. 25(2):223-239, 1967.

Total lipids were extracted from adult male Swiss mice, Yale strain, small intestine and used to study the solubilization of sugars in nonpolar solvent. Although monosaccharides are insoluble in pure nonpolar solvents, they could be solubilized by mixed lipids extracted from the mouse small intestine. An av. of 8.3 molecules of D-galactose could be solubilized in hexane/molecule of phospholipid. Stoichiometric studies indicated that solubilization was not due to a formation of a specific chemical complex between sugar and phospholipid, but was due to incorporation into micelles formed by amphophilic lipids. An apparent critical micelle conc. was detected at a phospholipid conc. of approx. 3×10^{-6} M. This phenomenon did not indicate the presence, in lipid extracts, of a specific membrane carrier, as had been suggested by previous authors. However, if sites (evidence for which was found) existed in the lipid phase of plasma membranes which correspond in structure to the hydrophilic interior of these micelles, such sites could incorporate sugar molecules and might be utilized in transmembrane passage. The solubilization of D-galactose in hexane was strongly inhibited by phlorhizin, an observation that may be relevant to the mechanism of phlorhizin action on the intestine. Max. solubilization was significantly different for 3 different sugars, but the order of preference was not similar to that for intestinal absorption. Mannose was solubilized significantly better than galactose, mannitol and urea; mannitol and 3-o-methylglucose were both solubilized significantly better than were galactose and urea. Filtration of hexane soln. through highly retentive paper markedly decreased the solubilization of D-mannitol and urea, without affecting that of D-galactose, 3-o-methyl-D-glucose and D-mannose.

10988 STUDIES IN VITRO OF THE PASSAGE OF SERUM PROTEINS ACROSS THE INTESTINAL WALL OF YOUNG RATS. (E.) Bamford, D. R. (U. Coll. North Wales, Bangor). Proc. Roy. Soc. [Biol.] 166:30-45, 1967.

The everted ileal sacs of 18-day-old rats were used as in vitro preparations to determine whether such preparations would be useful in studying the transport of γ-globulin. Such sacs were seen to remain viable and functional for at least 1 hr. when incubated at 37°C under aerobic conditions. When the transport of ^{131}I-labeled γ-globulin was examined in such a system it was seen that significantly more of the homologous γ-globulins were transported to the serosal compartment than either of the heterologous molecules. There was an increase in the conc. of free iodide in the final mucosal fluid. This was due to the degradation of labeled protein to small nonprecipitable U. γ-Globulins were transmitted differently from the mucosal to the serosal fluid depending upon the species. An increase in O_2 consumption of the tissues occurred during protein transport.

10989 EVIDENCE FOR A SPECIAL TYPE OF BICARBONATE TRANSPORT IN THE ISOLATED COLONIC MUCOSA OF BUFO ARENARUM. (E.) Lew, V. L. (Nat. Inst. Health, Haedo, Argentina) and N. J. Carlisky. Biochim. Biophys. Acta 135(4):793-796, 1967.

The existence of at least 2 different component
of the short circuit current in the isolated
colonic mucosa of the South American toad, Buf
arenarum was demonstrated. Females of between
250 and 350 g wt. were used within the first 2
wk. of captivity. At this time the observed
difference between the short circuit current a
the Na ion net·flux was max. Data from the pr
study clearly demonstrate the existence of a
bicarbonate transport in the short circuit cur
although no quantitative evaluation of its participation could be made. The present finding
not allow a conclusion as to whether the prima
process is the passage of bicarbonate from the
cell to the mucosal side or of H ion in the opposite direction.

10990 STUDIES ON IRON ABSORPTION. VI. TH
EFFECT OF BILE AND PANCREATIN ON THE
ABSORPTION OF IRON. (E.) Sörensen, E. W. (U.
Bergen, Norway). Acta Med. Scand. 181(6):707-
1967.

The effect of bile and pancreatin on Fe absorp
from the intestine was studied in anemic patie
in Fe-deficient and in non-Fe-deficient rats.
the 20 anemic patients, the enzyme preparation
(0.32 g dehydrated bile, 1.2 g pancreatin) wer
given together with Fe doses (300 mg Fe^{++}) and
standard meal. With the applied doses, neithe
the enzyme preparations had a significant effe
on Fe absorption. When Fe was given together
with a normal stock diet to non-Fe-deficient r
no effect of pancreatin (0.2 g) was found, and
a further addition of ascorbic acid or alcohol
had no increasing effect on Fe absorption. Pa
creatin inhibited a demonstrated increasing ef
which a carbohydrate-rich (0.5 g glucose), and
to a smaller degree, a fat-(1 g 35% cream) or
protein-(1 g skimmed milk powder)-rich meal ha
on the Fe absorption. In the nonanemic rats,
(0.16 g dehydrated bile) had a reducing effect
on the absorption of Fe; this occurred with ea
of the meals that Fe was given with (normal st
diet, carbohydrate, fat and protein). In rats
made Fe-deficient by means of repeated bleedin
and feeding of an Fe-poor diet, the Fe absorpt
was considerably higher than in the non-Fe-def
ient group. Pancreatin had a reducing influen
on the Fe absorption independent of the type o
meal given (normal stock diet, carbohydrate, f
or protein). Bile also had a significant redu
ing effect, except when the Fe was given toget
with carbohydrate. These results support the
concept that the pancreas produces a substance
that may be able to inhibit Fe absorption. In
addition, it is concluded that both bile and p
creatin have a reducing effect on Fe absorptio
rats.

10991 STUDIES ON IRON ABSORPTION. VII. I
ABSORPTION IN RATS WITH CARBON TETRA
CHLORIDE (CCL_4) INDUCED DAMAGE AND CIRRHOSIS O
THE LIVER. (E.) Sörensen, E. W. (U. Bergen,
Norway). Acta Med. Scand. 181(6):739-746, 196

absorption was studied in 3 groups of rats ex-
ed to CCl$_4$ vapor for 1 min./day during 45, 70
110 days, resp.; the animals were fed an Fe
e plus 1 g normal diet and 1 ml water or 1 g
mal diet and 1 ml of a H$_2$O-96% ethanol mixture.
addition, the effects of bile (0.16 g dehydrated
e) and pancreatin (0.2 g) on Fe absorption were
essed. Histologically, there were gradually
reasing signs of liver cell degeneration, ac-
panied in the 110-day group by a considerable
rease of connective tissue with a nodular ar-
gement of the liver cells. Increased amounts
Fe deposits were seen in the liver and pancreas.
other signs of pathological changes were found
the duodenum, spleen or pancreas. Fe absorp-
on was significantly reduced in all series after
CCl$_4$ treatment. The expected increasing ef-
t of alcohol was present, but this effect was
ufficient to increase the amount of absorbed
to the level found before CCl$_4$ treatment. Both
ncreatin and bile had a significant increasing
fect on Fe absorption; pancreatin doubled the
rcentage of absorbed Fe, whereas the effect of
e was somewhat less. This study offers strong
dence that liver injury or cirrhosis cannot
d to increased Fe absorption.

92 METHODS FOR STUDIES OF INTESTINAL ABSORPTION IN MAN. (E.) Duthie, H. L.
y. Infirm., Sheffield, England). Brit. Med.
l. 23(3):213-216, 1967.

93 TECHNIQUES, TERMINOLOGY AND PARAMETERS IN INTESTINAL ABSORPTION. (E.) Levin,
J. (U. Sheffield, England). Brit. Med. Bull.
(3):209-212, 1967.

94 HISTOLOGY AND CYTOCHEMISTRY OF THE CELLS OF THE SMALL INTESTINE, IN
LATION TO ABSORPTION. (E.) Pearse, A. G. E.
y. Postgrad. Med. Sch., London) and E. O.
ecken. Brit. Med. Bull. 23(3):217-222, 1967.

95 MEMBRANE TRANSPORT IN RELATION TO INTESTINAL ABSORPTION. (E.) Smyth,
H. (U. Sheffield, England) and R. Whittam.
it. Med. Bull. 23(3):231-235, 1967.

96 ELECTRICAL CHANGES IN RELATION TO TRANSPORT. (E.) Barry, J. C. (U.
effield, England). Brit. Med. Bull. 23(3):
6-269, 1967.

97 CLINICAL AND EXPERIMENTAL STUDIES OF ABSORPTION OF β-ACETYLDIGOXIN. (Ger.)
ndt, K. H. (St. George German Hosp., Hamburg,
rmany), G. Laubinger and A. Lenhartz. Deutsch.
d. Wschr. 92(35):1532-1537, 1967.

98 EXPERIMENTAL STUDIES ON THE DISTRIBUTION OF THE INTRAGASTRICALLY INTRODUCED ^{131}I-LABELED TRIIODOTHYRONINE AND ITS METABOLITES IN THE INNER ORGANS OF GUINEA PIG. (Pol.) Komarnicka, R. (3rd Intern. Dis. Clin., Danzig, Poland) and J. Kotarski. Endokr. Pol. 18(4): 377-388, 1967.

10999 ABSORPTION OF PROTEINS. (E.) Fisher, R. B. (U. Edinburgh, Scotland). Brit. Med. Bull. 23(3):241-246, 1967.

11000 ABSORPTION OF CARBOHYDRATES. (E.) Newey, H. (U. Sheffield, England). Brit. Med. Bull. 23(3):236-240, 1967.

11001 TRANSPORT OF GLUCOSE IN SMALL INTESTINE OF ALLOXAN DIABETIC RATS. (E.) Banerjee, S. (Dey's Med. Mfg., Calcutta, India) and S. D. Varma. Indian J. Exp. Biol. 5(2):125-126, 1967.

11002 IRON ABSORPTION IN ADVANCED OLD AGE. (Ger.) Brüschke, G. (Med. U. Clin., Berlin), E. Mehls and B. Zschenderlein. Deutsch. Gesundh. 22(35):1639-1640, 1967.

11003 PRESERVATION OF LIPIDS FOR ELECTRON MICROSCOPE STUDY. QUANTITATIVE STUDY OF LYMPHATIC CHYLOMICRONS IN THE RAT AFTER ADMINISTRATION OF TRITIATED OLEIC ACID. (Fr.) Carlier, H. (Fac. Sci., Dijon, France), G. Clément and C. Noirot-Timothée. C.R. Acad. Sci. [D] (Paris) 265(3):235-238, 1967.

11004 ABSORPTION OF FATS. (E.) Dawson, A. M. (St. Bartholomew's Hosp., London). Brit. Med. Bull. 23(3):247-251, 1967.

11005 FAT ABSORPTION FROM THE SMALL INTESTINE OF GNOTOBIOTIC CHICKS. (E.) Cole, J. R., Jr. (U. Georgia, Athens) and F. M. Boyd. Appl. Microbiol. 15(5):1229-1234, 1967.

11006 SALT AND WATER ABSORPTION BY THE INTESTINAL TRACT. (E.) Parsons, D. S. (U. Oxford, England). Brit. Med. Bull. 23(3): 252-257, 1967.

11007 ABSORPTION OF WATER-SOLUBLE VITAMINS. (E.) Matthews, D. M. (Westminster Med. Sch., London). Brit. Med. Bull. 23(3):258-262, 1967.

11008 ABSORPTION OF HEMOGLOBIN IRON IN MAN. (E.) Hallberg, L. (U. Goteborg, Sweden) and L. Sölvell. Acta Med. Scand. 181(3):335-354, 1967.

See also abstract nos.: 10936,10937,11324

11009 INTRACELLULAR TRANSPORT OF SECRETORY PROTEINS IN THE PANCREATIC EXOCRINE CELL. I. ROLE OF THE PERIPHERAL ELEMENTS OF THE GOLGI COMPLEX. (E.) Jamieson, J. D. (Rockefeller U., New York City) and G. E. Palade. J. Cell Biol. 34(2):577-596, 1967.

Electron microscopic radioautography of guinea-pig pancreatic exocrine cells established that secretory proteins are transported from the elements of the rough-surfaced endoplasmic reticulum to condensing vacuoles of the Golgi complex, possibly by small vesicles located in the periphery of the complex. In order to more clearly define the role of these vesicles in the intracellular transport of secretory proteins, the secretory cycle of the guinea pig pancreas was studied by cell fractionation procedures applied to pancreatic slices incubated in vitro. Such slices remain viable for 3 hr., and incur minimal structural damage during this period. Their secretory proteins can be labeled with radioactive amino acids in short, well-defined pulses which, followed by cell fractionation, facilitates a kinetic analysis of transport. In order to determine the kinetics of transport, sets of slices were pulse-labeled for 3 min. with leucine-^{14}C and incubated for further +7, +17 and +57 min. in chase medium. At each time, smooth microsomes (peripheral elements of the Golgi complex) and rough microsomes (elements of the rough endoplasmic reticulum) were isolated from the slices by density gradient centrifugation of the total microsomal fraction. Labeled proteins appeared initially (end of pulse) in the rough microsomes and were transferred subsequently during incubation in chase medium to the smooth microsomes, reaching a max. conc. in this fraction after +7 min. chase incubation. Labeled proteins later left the smooth microsomes to appear in the zymogen granule fraction. These findings provide direct evidence that secretory proteins are transported from the cisternae of the rough endoplasmic reticulum to condensing vacuoles through the small vacuoles of the Golgi complex.

11010 INTRACELLULAR TRANSPORT OF SECRETORY PROTEINS IN THE PANCREATIC EXOCRINE CELL. II. TRANSPORT TO CONDENSING VACUOLES AND ZYMOGEN GRANULES. (E.) Jamieson, J. D. (Rockefeller U., New York City) and G. E. Palade. J. Cell Biol. 34(2):597-615, 1967.

In a previous study, direct evidence was obtained that secretory proteins are transported from the cisternae of the rough endoplasmic reticulum to condensing vacuoles of the Golgi complex by small vesicles located in the periphery of the complex. Since condensing vacuoles ultimately become zymogen granules, this phase of the secretory cycle was studied in pulse-labeled slices. A zymogen granule fraction was isolated by differential centrifugation from guinea-pig pancreatic slices at the end of a 3-min. pulse with leucine-^{14}C and after varying times of incubation in chase medium. At the end of the pulse, few radioactive proteins were found in this fraction; after +17 min. in chaser, its proteins were half-max. labeled; they became max. labeled between +37 and +57 min. Paralle electron microscopic radioautography of intact cells in slices pulse-labeled with leucine-3H showed that zymogen granules became labeled, a the earliest, at +57 min. post-pulse. It was assumed that the discrepancy between these 2 s of results was due to the presence of rapidly labeled condensing vacuoles in the zymogen gra fraction. In order to clarify this assumption electron microscopic radioautography was performed on sections of zymogen granule pellets isolated from slices pulse-labeled with leucin and subsequently incubated in chaser. The results showed that the early labeling of the zymogen granule fractions was due to the prese of highly-labeled condensing vacuoles among th components of these fractions.

11011 GASTRIC SECRETION OF ACID AND INTRIN FACTOR DURING HISTAMINE INFUSION IN 14 CASES OF DUODENAL ULCER. (E.) Doteval1, G (Sahlgrenska Hosp., Goteborg, Sweden), A. Wala and A. Weinfeld. Scand. J. Haemat. 4(3):169-1 1967.

The secretion of HCl and of intrinsic factor w studied in 14 subjects (all men) with chronic duodenal ulcer before and during six 15-min. periods of i.v. histamine (0.0021-0.0354 mg/kg 15 min.) infusion. The quantity of infused histamine was increased with each 15-min. peri The vol. of gastric juice increased successive during the first 4 periods and was max. and equal in the last 3 periods of increasing histamine stimulation. The secretion of HCl increased steadily during the increasing rate histamine infusion, reaching a max. and equal output in the final 2 periods. The conc. of intrinsic factor was max. in the first period and decreased steadily in the following period of histamine stimulation. The output of intrinsic factor was max. during the first 3 periods and decreased during the following per in spite of increasing rate of histamine infusion. Since the vol. of gastric juice was max. and equal during the final 3 periods, the fall in intrinsic factor conc. was more marked than the decrease in its output. The conc. of intrinsic factor in the final period was lower than basally. These results indicate that histamine causes a washout of stored intrinsic factor. The output of intrinsic factor, howev was still significantly higher than basally, even 75-90 min. after histamine infusion had started. This fact could be due to a late was out mechanism or to a stimulation of intrinsic factor production and secretion.

12 ANTRAL ACTIVITY AND SYMPTOM PERIODICITY IN DUODENAL ULCERATION. (E.)

estin, L. R. (Bristol Roy. Infirm., England).
8(4):318-324, 1967.

3 groups of subjects, the 3 main factors olved in gastric secretion were studied: 1) ral response to mechanical stimulation; 2) ral response to chemical stimulation; and 3) x secretory capacity of the parietal cell ulation. The subjects studied included Group 5 patients with no gastrointestinal disorder; up 2, 5 patients with quiescent duodenal eration; and Group 3, 10 patients with active denal ulceration. A modification of a tube lumen) devised by Marks to study secretion er Polya gastrectomy was used. Histamine was n. i.v. at the rate of 5 mg/hr., and a meat h used consisted of a standard Bovril soln. pared by diluting 15 ml of the commercial centrate with H_2O to a total of 400 ml and at its natural pH of 5.5. Normal and escent duodenal ulcer patients showed similar ral activity, but this was increased in the ent with an active duodenal ulcer. Hourly put of secretion in the active ulcer group in ponse to mechanical stimulation was higher n the hourly output to chemical stimulation normal subjects. Antral activity was increased ing periods when exacerbation may be asso- ted with changes in cholinergic tone. It is gested that the episodic nature of duodenal eration depends on variations in antral activity, that healing of an ulcer occurs when the ponse to antral stimulation by food produces arietal cell output of less than 15 mEq/hr.; this respect, there is no difference between called hyposecretors and hypersecretors.

13 SECRETORY RESPONSE OF THE HUMAN PANCREAS TO CONTINUOUS INTRAVENOUS USION OF PANCREOZYMIN-CHOLECYSTOKININ (CECEKIN).

) Banwell, J. G. (Gen. Hosp., Birmingham, land), B. E. Northam and W. T. Cooke. Gut):380-387, 1967.

secretory response of the human pancreas to tinuous i.v. infusion of a pancreozymin- lecystokinin compound (Cecekin) was determined 3 normal subjects (22-65 yr. old) and in ients with various gastrointestinal disorders; latter included 3 with chronic pancreatitis, ith acute pancreatitis, 2 with chronic lecystitis and cholelithiasis (1 before and 1 er cholecystectomy), 4 with adult celiac ease, 1 with tropical sprue in remission, 2 h hepatic cirrhosis, 1 with diarrhea of unknown gin, 1 with diabetic diarrhea, and 1 with the nkhite-Canada syndrome. The pancreozymin- lecystokinin preparation was infused in a ilar manner to secretin at rates sanging from 312-0.5 Harper U pancreozymin/kg/min. Amylase put in basal collections in normal subjects ged from 700-2780 U/min.; a max. amylase out- was obtained in normal subjects in response infusion of the preparation. The 3 patients with chronic pancreatitis had very low max. amylase outputs (24, 12 and 105 U/min., resp.); the patient with postacute phase of acute pancreatitis had a max. response in the normal range (5,350 U/min.); both patients with chronic cholecystitis had normal amylase responses. Of the 4 patients with adult celiac disease, 2 had a max. amylase output within normal range, and 2 had significantly reduced levels of amylase output. The patient with tropical sprue had a low max. amylase output; 1 patient with hepatic cirrhosis had a low amylase output and the other had a normal response. The patient with diarrhea of unknown origin had a subnormal response; the subject with diabetic diarrhea had a low amylase output and the Cronkhite-Canada syndrome patient had a normal max. response. The amylase output after pancreozymin inj. during the secretin-pancreozymin test was lower than the max. amylase output with the pancreozymin-cholecystokinin preparation. All 3 patients with chronic pancreatitis showed no significant elevation in amylase output on pancreozymin stimulation. The protein content of duodenal fluid was not a satisfactory measure of the total amylase output. It is concluded that the secretory response of the human pancreas to continuous i.v. infusion of pancreozymin-cholecystokinin provides an accurate measurement of max. enzyme secretory capacity of the pancreas and eliminates errors due to "wash-out" of amylase.

11014 DIVERSION OF PANCREATIC JUICE ON GASTRIC AND PANCREATIC RESPONSE TO A MEAL STIMULUS. (E.)

Cooke, A. R. (VA Ctr., Los Angeles, Calif.), D. L. Nahrwold and M. I. Grossman. Amer. J. Physiol. 213(3):637-639, 1967.

Three dogs were prepared with a vagally-denervated pouch of the oxyntic gland area (Heidenhain) and a permanent pancreatic fistula; gastric and pancreatic secretion were stimulated by feeding of 250 g of proprietary dog food. Three types of experiments were made in randomized order: 1) the duodenal fistula was not opened so that pancreatic juice drained into the duodenum; 2) all the pancreatic juice was collected every 15 min.; and 3) pancreatic juice was collected every 15 min., and most was then immediately returned to the duodenum. Exclusion of pancreatic juice resulted in a higher acid output from the Heidenhain pouch, and an increase in vol. rate of secretion and bicarbonate output from the pancreas; these effects were abolished by reinstilling pancreatoc juice into the duodenum. Peak bicarbonate output and peak vol. rate of secretion when pancreatic juice was replaced was approx. 60% of that obtained when all of the pancreatic juice was diverted; this can be partially explained by assuming that the presence of pancreatic juice in the duodenum helps to keep the pH neutral, so the secretin mechanism is not fully activated.

11015 MEMBRANE DISCONTINUITIES AND SECRETORY GRANULE FORMATION IN RABBIT PANCREATIC ACINAR CELLS. (E.) Shapiro, S. H. (Jewish Chronic Dis. Hosp., Brooklyn, N. Y.) and S. S. Lazarus. Exp. Molec. Path. 6(3):320-334, 1967.

In osmium tetroxide-fixed (New Zealand white) rabbit (both sexes) pancreatic acinar cells, granules were found ranging in density from electron opaque to electron-lucent. Many of the less dense prozymogen granules were discontinuously limited by smooth membrane in the form of an incomplete band or separated curvilinear segments. Often small, smooth membrane-bound vesicles were found in close association with the granule limiting membrane at points of interrupted limiting membrane. Some small vesicles appeared to originate in the centrosphere region from transition elements of rough and smooth endoplasmic reticulum at the forming face of the Golgi complex, or from the broadened ends of flattened Golgi saccules. Smooth-membraned portions of the endoplasmic reticulum were noted within the granule matrix near membrane-less points of the granule perimeter. Prozymogen granules appeared to form by dilatation and separation of Golgi vacuoles, and/or by delimitation of circumscribed areas of matrix and confluence of small vesicles. Vesicles deriving either from endoplasmic reticulum or Golgi complex seemed to contribute to the formation of the secretory granule and its limiting membrane. Discontinuities in granule limiting membrane were also noted after fixation by permanganate, osmium drip or osmium tetroxide with added $CaCl_2$; this indicated that the membrane discontinuities were not artifactual.

10116 INHIBITION OF VAGALLY STIMULATED GASTRIC SECRETION AFTER MUCOSAL MAST CELL DEGRANULATION. (E.) Hirvonen, J. (U. Helsinki), V. Kamppuri and T. Räsänen. Acta Physiol. Scand. 70(2):236-240, 1967.

Total vagotomy was done on male Sprague-Dawley rats, and the peripheral end of the vagus nerve was electrically stimulated for 1 hr. after closing the ventricle with a Shay ligature; controls were operated upon in an identical manner, but were not stimulated. The mast cells in the gastric mucosa were degranulated with dexamethasone admin. i.m. in 1 group of rats. After stimulation, the gastric fluid was collected, and its vol., pH and conc. of free HCl were measured. Vol. of gastric secretion was equal in both groups of rats (given electrical stimulation with or without previous dexamethasone treatment), but the pH of the gastric fluid in the untreated rats was clearly less than that of the dexamethasone group; the conc. of free HCl was much higher in the former than in the latter group, in which an almost complete degranulation of the mucosal mast cells was demonstrated histologically. The importance of the synthesis and accumulation of histamine in the mast cells of the gastric mucosa as a peripheral link in the stimulatory chain of gastric secretion is discussed.

11017 DIFFERENT HORMONAL RESPONSES OF MAST CELLS IN GASTRIC MUCOSA AND DERMIS IN THE RAT. (E.) Räsänen, T. (U. Helsinki). Scand. J. Gastroent. 2(2):118-123, 1967.

Four-mo.-old Wistar rats were divided into 6 groups according to treatment: Group 1, ACTH-zinc, admin. i.m. 4 x 2 I.U. at 24-hr. interval Group 2, ACTH as in the first group, plus asbestos 1.0 mg in sterile aqueous suspension o 1.0 ml as a single intra-abdominal inj. at the start of ACTH therapy; Group 3, asbestos as in the second group, 4 days before sacrifice; Grou 4, ACTH as in the first group plus heparin 9 x 1.0 mg at 12-hr. intervals; Group 5, hepari as in the fourth group; and Group 6, 6 x 0.5 ml of saline, admin. i.m. The responses of the gastric mucosal mast cells and the s.c. mast cells of the abdominal skin of the rat were studied after these procedures. The superficia portion of the gastric mucosa contained roughly 5 times as many mast cells as the s.c. connecti tissue. After ACTH, the mast cell count in the gastric mucosa decreased clearly after both heparinization and asbestos admin.; approx. 75% of the gastric mucosal mast cells were degranulated. Peritoneal irritation with steri asbestos alone produced a weak decrease in the count of mucosal mast cells. There was no clea increase in the mast cell count after hepariniz tion. The number of s.c. mast cells was fairly stable in the different phases of the experimen after admin. of ACTH, asbestos and heparin. Th observed differences indicate that mast cells in the gastric mucosa and in the epidermis may have important special, but clearly differing, functions. In the gastric mucosa, the sensitiv ness of the mast cells is possibly connected with their function as a peripheral mediator of stimulation of gastric secretion.

11018 THE EFFECTS OF VARYING THE EXTRACELLULAR POTASSIUM CONCENTRATION ON THE SECRETORY RATE AND ON RESTING AND SECRETORY POTENTIALS IN THE PERFUSED CAT SUBMANDIBULAR GLAND. (E.) Petersen, O. H. (U. Copenhagen) and J. H. Poulsen. Acta Physiol. Scand. 70(3-4 293-298, 1967.

In young cats, the left submandibular gland and its duct were prepared for perfusion; the perfusion fluid was a Locke's soln. of the following composition (mmoles/liter): Na, 142; K, 4.0; Ca, 1.5; Mg, 1.0; Cl, 127; HCO_3, 22; HPO_4, 1.1; and glucose, 10.0; modified Locke's soln. with the following K conc. were used: 0.2, 0.5 20.0 and 50.0 mmoles/liter; in these cases corresponding changes in the Na conc. ensured constant osmolarity. Secretory potentials were evoked partly by electrical stimulation (10 cycles/sec.; 10 volts) of the chordalingual nerve, and partly by inj. of acetylcholine (5 μg) into a common carotid artery cannula. For experiments with measurement of the secretory rate a continuous infusion of acetylcholine (70 μg/min.) was used. Potentials were never

corded until at least 5 min. (generally 10 min.)
d elapsed after changing the perfusion fluid.
e sensitivity of resting potentials and secre-
ry potentials to changes in K conc. was the
me; both increased to the greatest value at
5 mmoles/liter of K and decreased almost
nearly at 4 and 20 mmoles/liter of K. Both
creased when the K conc. was changed from 0.5
0.2 mmoles/liter of K. At extracellular K
nc. of 50 mmoles, a secretory potential of 5
llivolts could be evoked at a resting potential
-22 millivolts. Comparison of the secretory
tes at different K conc. (4 and 0.2; 4 and 0.5;
and 20), the secretory rates were always greater
the lowest conc. of K. Comparison of the
zes of the secretory potentials and the
cretory rates at different K conc. in the
rfusate showed that at 0.2 and 0.5 mmoles/liter
K, the secretory rate was greater than the
cretory potential, and increased linearly in
rallel from 0.2 to 0.5; the secretory rate
creased to the value of the secretory potential
4 mmoles/liter of K, and decreased to a value
ss than that of the secretory potential at 20
oles/liter of K. These findings support the
ndberg hypothesis that secretory potentials in
livary glands are due to an active transport of
ions, which transport should be responsible
the formation of the saliva. It is concluded
at the secretory potentials and the secretory
te depend in much the same way on the extra-
llular K conc.

019 THE EFFECT OF RATE OF GLAND FUNCTION ON PAROTID FLUID URIC ACID LEVELS.
.) Shannon, I. L. (USAF Sch. Aerospace Med.,
ooks Air Force Base, Tex.) and H. H. Chauncey.
. Air Force Sch. Aerospace Med. SAM-TR-67-29:
, 1967.

55 healthy, young adult male enlistees who had
sted overnight, single unstimulated and 5 pairs
exogenously stimulated parotid fluid samples
re collected at as near rest conditions as
ssible. Stimulation was effected by admin. of
ric acid in increasing conc. of 0.1%, 0.2%,
%, 0.8% and 1.6%; sample time for stimulated
llections was 10 min. during which acid portions
re taken at 1-min. intervals and held for 30
. Venous blood samples were collected after
last sample of parotid fluid was taken. Uric
d determination was achieved by the uricase
ocedure in the case of both serum and parotid
uid samples. The mean serum uric acid level
all subjects was 5.04 mg/100 ml. The admin.
increasing conc. of citric acid led to 5.6,
, 11.7, 14.9 and 19.7-fold increase in uric
d flow rates over the unstimulated rate. This
fference was highly significant. As the mean
w rate increased (0.046 to 0.908 ml/min.) the
n uric acid conc. decreased (10.03 to 3.09
100 ml). As the flow rate was increased, the
n uric acid secretion rate increased pro-
ssively to a high of 26.41 µg/min. This
fference between the mean unstimulated and
mulated uric acid secretion rate was also
significant. It is concluded from these data, that collection flow rates of parotid fluid for uric acid determinations should be 0.7 ml/min. or more.

11020 OBSERVATIONS ON THE SECRETION OF THE SUBMANDIBULAR AND SUBLINGUAL GLAND OF MOUSE EMBRYO UNDER NORMAL CONDITIONS AND IN CULTURE. (It.) DiGiovine Vecchione, L. (U. Naples, Italy). Histochemie 9(3):203-216, 1967.

Under normal conditions secretory activity of submandibular and sublingual glands of mouse embryo becomes histochemically detectable intracellular material at the sixteenth day of gestation. At the seventeenth day differences may be shown between the 2 glands in the morphological features of the secretion as well as in the intensity of the periodic acid-Schiff, Hale's and alcian blue histochemical reactions and in the behavior towards toluidine blue. The latter dye gave metachromatic staining after sulfation in the sublingual, but not in the submandibular gland, indicating that the polysaccharide component of the secretion has different characteristics in the 2 glands. With in vitro cultures (made on a clot of chicken plasma and embryo extract) of glands at the thirteenth day of gestation, secretion appeared at the same total age as with the in vivo glands but the ramification process went on at a slower rate. The glands developed in vitro for 10 days and their histochemical features appeared to be comparable to those which were observed in normal developmental conditions. At explantation time, they were just beginning their differentiation and both consisted of an epithelial cord and a solid bud and were contained in a common mesenchymal capsule.

11021 EFFECT OF EPINEPHRINE ON INSULIN RELEASE IN MAN INDUCED BY SECRETIN. (E.) Nelson, J. K. (Johns Hopkins Hosp., Baltimore, Md.), D. Rabinowitz and T. J. Merimee. Nature (London) 215(5103):883-884, 1967.

After an overnight fast, 4 normal female subjects were given an infusion of epinephrine (4-8 µg/min.); 45-min. later, an i.v. inj. of 75 U of secretin was given. During the initial period of epinephrine infusion, the conc. of plasma insulin did not change appreciably from those before infusion, despite significant elevations in the conc. of plasma glucose in all 4 subjects (av. rise 51.6 mg/100 ml; range 37.0-70.5 mg/100 ml). When secretin was admin., conc. of plasma insulin rose in all 4 subjects (av. rise 28.5 µU/ml; range 5-52 µU/ml). The greatest increases occurred at 2 min. and then rapidly fell to approach pre-inj. values within 10 min. When epinephrine infusion was discontinued, all subjects showed a marked rise in plasma insulin values that were greatest at 10-30 min. Two subjects were investigated with an identical dose of secretin when hyperglycemia was produced by infusion of 300 mg of dextrose/min.; conc. of plasma glucose rose to 47.9 and 46.5 mg/100 ml, and those of plasma insulin increased 19 and 9 μU/ml, resp., after 45 or 80 min., at which time they were given an identical dose of secretin as in the epinephrine experiment; plasma insulin conc. promptly rose, reaching a peak at 4 min., which represented a further rise of 25 and 26 μU/ml, and rapidly fell thereafter. It is concluded that secretin can, in the presence of hyperglycemia, cause a significant elevation in conc. of plasma insulin; this effect is not inhibited by epinephrine, an agent that blocks release of insulin observed after i.v. admin. of glucose. Secretin thus fulfils the requirements as a mediator of the mechanism which produces the augmented secretion of insulin observed after p.o., as compared with i.v., admin. of glucose.

11022 K$^+$-STIMULATED PHOSPHATASE OF MICROSOMES FROM GASTRIC MUCOSA.

(E.) Forte, J. G. (U. California, Berkeley), G. M. Forte and P. Saltman. J. Cell Physiol. 69(3):293-304, 1967.

The light microsomal fraction was isolated from homogenates of rabbit and bullfrog gastric mucosa. Upon examination with the electron microscope, the light microsomes appeared as tubular membranous structures with morphology and dimensions similar to the elements of the smooth-surfaced endoplasmic reticulum observed in intact oxyntic cells. A K-stimulated, Mg-requiring p-nitrophenylphosphatase was demonstrated in the gastric microsomes. Neither Na nor ouabain (10^{-6} to 10^{-3} M) altered the K-stimulated phosphatase. Thiocyanate was not very effective as an inhibitor of the gastric microsomal phosphatase, in contrast to the effect of this anion on the ATPase activity; however, the gastric phosphatase as well as the ATPase were destroyed by phospholipase C, thereby showing the lipoprotein nature of these enzymes. Kinetics of the K-ion activation of the microsomal phosphatase suggest that the K-ion-p-nitrophenylphosphatase complex is the active substrate for the enzymic reaction. Rb, NH_4 and Cs were found to substitute to some degree for K ion as an activator of the microsomal phosphatase. It is pointed out that K ion is an essential requirement for HCl secretion in intact gastric mucosa and the replacement of K ion with Rb, Cs and NH_4 is discussed. The K-ion stimulated phosphatase presented in this study may play a role in the H-ion secretion process.

11023 PROTECTIVE ACTION OF SALIVA IN PEPTIC ULCERATION. STUDIES ON THE EFFECT OF SALIVA ON GASTRIC SECRETION WITH DYE-DILUTION TECHNIQUE.

(E.) Malhotra, S. L. (Jagjivan Ram Hosp., Bombay, India). Scand. J. Gastroent. 2(2):95-104, 1967.

The effect of saliva on gastric secretion was studied in 41 adult men (17-53 yr. old, with a mean of 33 yr.) by the method of serial test meals. The essence of the experiments was to exclude saliva from the stomach in 1 set of observations and allow its admixture with food in the other set. The gastric acidity was significantly reduced by ingestion of saliva both in the case of fluid, as well as solid, meals. Differences in the mean acidities of the samples were larger in the case of masticatory meals, whereas in the case of nonmasticatory mash meals these differences were insignificant. Mucus in the aspirates from the stomach was mostly of salivary origin, and it appeared likely that the buffering action of saliva was exerted not only through its bicarbonate content, but also through its mucus content. Variations were observed in the titer of group-specific substances as well, but their significance was less clear. These findings have implications with regard to the possible protective action of saliva in peptic ulceration. If, as suggested previously, lack of ingestion of sufficient saliva, depending on the nature of the diet and the pattern of eating, is a major factor in development of peptic ulcer, there is hope that this disease may be controlled and prevented by preparation of diets in a manner that requires thorough mastication and ingestion of larger quantities of saliva of higher buffer capacity, greater mucus conc. and in larger total quantities.

11024 BLOCKADE OF VITAMIN B_{12}-BINDING SITES IN GASTRIC JUICE, SERUM AND SALIVA BY ANALOGUES AND DERIVATIVES OF VITAMIN B_{12} AND BY ANTIBODY TO INTRINSIC FACTOR.

(E.) Gottlieb, C. W. (Mount Sinai Hosp., New York City), F. P. Retief and V. Herbert. Biochim. Biophys. Acta 141(3):560-572, 1967.

A variety of vitamin B_{12} analogs and derivatives (pseudo-vitamin B_{12}, anilide-B_{12}, aquoanilide-B_1 cobinamide, cobrynamide, 5,6-dimethylbenzimidazo and 5 different cobaloxime compounds) were teste for their ability to reduce the unsaturated vitamin B_{12}-binding capacity of gastric juice, serum and saliva. The effect of these substance on specific binders in body fluids tested, was determined by rapid DEAE-cellulose chromatograph All vitamin B_{12}-like substances, except cobaloximes and 5,6-dimethylbenzimidazole, bound well to non-intrinsic factor vitamin B_{12} binders in normal gastric juice. Conversely only intrinsic factor antibody and cyanocobalamin blocked radioactive vitamin B_{12} binding to intrinsic factor. The B_{12} binders in pernicious anemia gastric juice were not effectively blocked by either intrinsic factor antibody or analogs. The precluded use of analogs instead of intrinsic factor antibody for assay *in vitro* of intrinsic factor in gastric juice in the system described. Unsaturated vitamin B_{12}-binding capacity of normal, chronic myelogenous leukemia and pernicious anemia serum was affected very similarly, and in a pattern resembling that of the nonintrinsic factor binder of normal gastric juice, except that cobaloxime C_3, was effective in reducing

: serum binding of vitamin B_{12}. Chromatography
owed equal reduction of both α-globulin and
lobulin binders. Analog interference with
amin B_{12} binders in saliva was essentially
nilar to, but more pronounced than, the results
:h serum and nonintrinsic factor binders in
tric juice.

)25 TOTAL NITROGEN CONTENT OF HUMAN
DUODENAL JUICE BEFORE AND AFTER
RAVENOUS INJECTION OF SECRETIN. (E.)
ersen, H. (Ulleval Hosp., Oslo), J. Myren and
P. Foss. Scand. J. Gastroent. 2(1):1-6,
7.

ability of secretin to alter total N content
duodenal juice was evaluated on 29 occasions
27 adult hospitalized patients; 2 patients
mined twice were recorded as 4 patients. The
ients were divided into a patient group with
mal pancreatic function (8 men, 8 women;
71 yr. old, with an av. of 49 yr.), in whom
clinical diagnosis was no organic disease in
duodenal ulcer in 3, diarrhea of unknown
gin and abdominal pain in 2 each, and 1 each
h drug-induced diarrhea, regional enteritis,
atic cirrhosis and pancreatic carcinoma; a
ient group with pathological pancreatic func-
n (5 men, 8 women; 16-73 yr. old, with an av.
53 yr.) included 6 with chronic pancreatitis,
ith diarrhea of unknown origin, 2 with liver
ease with unknown etiology, and 1 each with
creatic carcinoma and parasitic disease. The
n conc. of total N was approx. 100 mg/100 ml
duodenal juice before stimulation with secretin
dropped to approx. half this value after
retin; in patients with pathological values
vol. or bicarbonate conc. after secretin inj.,
decrease in total N conc. after stimulation
significantly less. The av. value of total
onc. and that evaluated from total protein
ermination were 100 mg and 10-20 mg/100 ml,
p.; this discrepancy was explained by a rapid
radation of proteins in the duodenal juice.
total N determination was inferior to estima-
n of bicarbonate conc. in differentiating
ween a normal and pathological pancreatic
ction, but similar to that of vol. rate and
erior to the estimation of amylase activity.
ore secretin stimulation a highly significant
relation was found between the conc. of total
nd those of total protein and amylase activity.
er stimulation a slighter, significant
relation only was found between the conc. of
al N and total protein in the first 20-min.
t-secretin period.

26 SOME PRACTICAL PROBLEMS RESULTING FROM
THE LEVEL OF PEPTIC ACTIVITY OF HUMAN
TRIC JUICE. (Fr.) Bonfils, S. (Bichat
p., Paris), J. Vatier, P. Zeitoun, M. Dubrasquet
Y. Lemercier. Rev. Franc. Etud. Clin. Biol.
4):349-358, 1967.

varying composition of gastric juice,
ecially protein and mucus content, and the

specific type of substrate were studied in 94 different gastric juice samples. The best substrate found for this experiment was 5% plasma. The amount of tyrosine (µg/ml) produced in 10 min. at 37°C was taken as an index of peptic activity; a preparation without substrate in each case was tested for endogenous tyrosine which was subtracted from the value obtained with substrate. The pH of the digest was adjusted to a value between 2.0 and 3.5 with N HCl. However, the free acidity was variable and the peptic activity changed in a very sporadic manner. With the factors which cause these variations eliminated, thus giving a sample of gastric juice that could be reproduced, a useful clinical method may evolve.

11027 POTASSIUM IN GASTRIC JUICE UNDER NON-STEADY-STATE CONDITIONS. (E.) Öbrink, K. J. (U. Uppsala, Sweden) and M. Waller. Scand. J. Gastroent. 2(1):44-48, 1967.

In a Heidenhain pouch dog, the K ion conc. of the gastric juice was analyzed after continuous i.v. inj. of histamine dihydrochloride (0.3 and 1.5 mg/hr.) following a starvation period of at least 12 hr.; when a steady-state condition was obtained, the inj. rate was suddenly changed to another higher or lower value, thus causing the secretion rate to increase or decrease to a new steady-state level. The steady states of the secretion rates and changing over from different steady states were studied. The conventional observation that the K conc. is independent of the secretion rate in the steady state was confirmed, but it was also found that during an increase of the secretion rate, the K conc. in the juice showed a transient increase. In changing the secretion rate to a lower steady level, the K conc. showed a similar deviation in the opposite direction before returning to its steady-state level. It is suggested that this phenomenon is due to a loss and uptake of K by the mucosa when stimulation is begun or terminated.

11028 LATENCY OF THE GASTRIC SECRETORY RESPONSE TO SHAM FEEDING IN THE DOG. (E.) Preshaw, R. M. (McGill U., Montreal, Canada). Canad. J. Physiol. Pharmacol. 45(4): 633-641, 1967.

Three conscious mongrel dogs were prepared with gastric fistulas. Sham feeding (with 600 g commercial dog ration) caused an increase in acid output after a mean delay of 6.4 min., and pepsin output was similarly increased after 5.9 min. The mean peak rate of secretion of acid in 25 min. after beginning sham feeding was 919 µEq/min., and was attained 13.4 min. after the stimulus was begun; for pepsin output the peak rate was 409 U/min., reached 11.6 min. after sham feeding was begun. Infusion of gastrin alone caused a graded increase in output of both acid and pepsin as the dose (0.313-80 g/hr.) was increased; the highest dose (80 g/hr., admin. i.v.) caused the highest rate of acid secretion (mean, 868 μEq/min.) and of pepsin output (mean, 252 U/min.). In other experiments, an infusion of 20 g gastrin i.v./hr. stimulated acid output after a mean delay of 9.5 ± 0.8 min. When a background secretion was induced with various doses of hog gastrin, the latency of the acid response to sham feeding was unchanged, but the latency of the pepsin response was shortened. The peak rates of acid and pepsin secretion after sham feeding were not altered by the infusion of gastrin. The observation that the latency of the pepsin response to sham feeding could be significantly reduced by a background gastrin stimulation indicated that the glandular cells responsible for pepsin secretion had a shorter latency than the acid-secreting cells.

11029 OXIDATIVE PHOSPHORYLATION AND THE EFFECTS OF SCN ON MITOCHONDRIA ISOLATED FROM RABBIT STOMACH. (E.) Forte, J. G. (U. California, Berkeley), G. M. Forte, R. Gee and P. Saltman. Biochem. Biophys. Res. Commun. 28(2): 215-221, 1967.

Mitochondria were isolated from rabbit gastric mucosa and incubated in a respiration medium containing 63 mM histidine-HCl buffer (pH 7.5), 4 mM $MgCl_2$, 85 mM sucrose, 2 mg/ml bovine serum albumin and 11 mM sodium glutamate as substrate. Respiration was polarographically measured at 24°C. Calculated ADP/O values for various gastric mitochondrial preparations were between 2.2 and 2.7; rabbit kidney cortex mitochondria prepared by similar procedures gave ADP/O ratios of 3.0 for the same substrate. The coupling ratios between fully supplemented mitochondria and those limited by ADP acceptor were lower in gastric (range 4.0-6.0) than in kidney (7.0-9.0) mitochondria. Addition of thiocyanate ion reduced the respiratory rate of fully supplemented mitochondria, but relatively high conc. were required; 40-50 mM thiocyanate ion produced 50% inhibition. Relatively high conc. of thiocyanate ion were required to reduce mitochondrial ATPase activity of intact rabbit stomach mitochondria. These results show that mitochondria isolated from rabbit gastric mucosa have mechanisms of oxidative phosphorylation and respiratory control typical of mitochondria from many tissues. That gastric mitochondria do readily synthesize ATP makes it unlikely that the H ions of the secretory product are provided by substrate H atoms directly linked to electron transfer, through the mitochondrial cytochrome chain, to molecular O_2. The results also demonstrate that thiocyanate ion does inhibit mitochondrial function, i.e., oxidative phosphorylation, respiration and ATPase; however, the conc. of thiocyanate ion required to produce significant decrements in these parameters is considerably higher than that required to inhibit H ion secretion by gastric mucosa. It is thus unlikely that thiocyanate ion manifests its primary effect on H ion secretion by inhibiting mitochondrial reactions.

11030 NATURE OF THE GASTRIC SECRETAGOGUE IN ZOLLINGER-ELLISON TUMOURS. (E.) Gregory, R. A. (U. Liverpool, England), M. I. Grossman, H. J. Tracy and P. H. Bentley. Lancet 2(7515):543-544, 1967.

Two pancreatic tumors, 1 weighing 2.5 g and the other 17 g, were obtained from cases of the Zollinger-Ellison syndrome. Extracts were prepared separately by the first stage of the metho of Gregory and Tracy for isolation of gastrin from antral mucosa, and aliquots of the extracts were shown to stimulate gastric acid secretion when inj. into conscious dogs. The remainders c the 2 extracts were then combined and taken through the remaining stages of the procedure for isolation of gastrin, ending with a single stage of chromatographic fractionation on amino-ethylcellulose. Amino acid analyses of the remaining extract and of human gastrin, as well as other chemical characteristics of the extract indicates that Zollinger-Ellsion tumor contains 1 or the other, or both, of the gastrin peptides which have been isolated from human antral mucos

11031 GASTRIN-LIKE EFFECTS OF CHOLECYSTOKIN PANCREOZYMIN. (E.) Celestin, L. R. (Southmead Hosp., Bristol, England). Nature (London) 215(5102):763-764, 1967.

The effects of pure cholecystokinin-pancreozymin (admin. i.v. at a constant rate of 2 Crick, Harper and Raper U/kg/hr.) on the human stomach and pancreas were compared with the response of these same organs to a gastrin analog (a tetrapeptide, admin. i.v. at a rate of 0.5 μg/kg/hr.) at these conc. responses were submax. Cholecystokinin-pancreozymin induced an acid response in the resting stomach, increasing both the vol. and conc. of the acid and leading to a steady level of secretion (av. 12 mEq/hr.) in approx. an hr.; a very similar response was obtained with the gastrin analog (av. 14 mEq/hr.). In both cases, a rise in the H ion conc. was accompanied by a fall in Na ion conc. When both substances were given together at these rates, the one on a background infusion of the other, whether the analog preceded or followed the cholecystokinin-pancreozymin, the acid response of the stomach exhibited an additive effect, with no evidence of potentiation (av. 16.5 mEq/hr.). When tested on the pancreas, both substances induced a similar pattern of output of amylase and trypsin. It is concluded that cholecystokinin-pancreozymin displays gastrin-like effects; it is possible that cholecystokini pancreozymin and not gastrin, accounts for the gastrin-like activity found in extracts of duodenal mucosa. The similarity of action of these 2 hormones suggests that they may have important amino-acid sequences in common.

11032 INHIBITION OF GASTRIC ACID SECRETION BY INTRAVENOUS CHOLECYSTOKININ EXTRACT (E.) Bedi, B. S. (Western Infirm, Glasgow,

tland), J. P. Govaerts, S. P. Master and I. E.
lespie. Scand. J. Gastroent. 2(1):68-76, 1967.

rapid single i.v. inj. of the cholecystokinin
paration Cecekin (75 clinical U) inhibit the
ponses of Heidenhain pouch dogs to stimulation
gastrin extract or synthetic gastrin-like penta-
tide (20 μg/hr., admin. i.v.) at both submax.
supramax. dose rates, to histamine (dihydro-
oride, 0.125-0.5 mg/hr., admin. i.v.) to the
ole cholinergic drug methacholine (1 mg/hr.,
in. i.v.) and to feeding a meat meal (11 ounces).
pattern of inhibition suggested that the
ibitor effect was exerted in the region of the
d-secreting cell. Pure cholecystokinin
ibited the acid response of the Heidenhain
ch dogs to histamine. Although both pure
retin and pure cholecystokinin are possible
ibitor agents arising from the duodenal mucosa,
is likely that endogenous duodenal acidifica-
n releases a further, as yet unidentified,
oral inhibitor agent, or that secretin and/or
lecystokinin may act in collaboration with
n other or a further inhibitor agent. In
nals with both a Heidenhain pouch and a simple
cula into the normally vagally-innervated
tric remnant and in which antrectomy had been
formed, a single rapid i.v. inj. of the
ecystokinin preparation had no effect on the
lenhain pouch responses to the continuous i.v.
sion of histamine. However, the acid output
n the main gastric remnant was increased by
cholecystokinin inj. The possibility is
ed that this cholecystokinin preparation
ains some gastrin-like activity.

3 PENTAPEPTIDE INFUSION TEST. (E.)
Konturek, S. J. (1st Intern. Dis.
., Cracow, Poland) and J. Lankosz. Scand. J.
roent. 2(2):112-117, 1967.

apeptide was admin. by continuous i.v.
sion to 20 subjects (10 healthy males, 10
enal ulcer patients) at a dose of 1.5 μg/kg/hr.,
histamine was similarly given at a dose of
g/kg/hr. The pentapeptide was also given
healthy volunteers either i.v. in graded
s of 0.3-1.5 μg/kg/hr. or s.c. at 7.5 μg/kg,
also histamine, either i.v. in doses of
0 μg/kg/hr. s.c. at 40 μg/kg. Pentapeptide
sed i.v. in graded doses provoked at a dose
.5 μg/kg/hr. a peak acid output which was
ificantly higher than the acid secretion
ced by i.v. histamine in a dose of 40 μg/kg/hr.
he 5 healthy subjects. The pentapeptide
sion test at a dose of 1.5 μg/kg/hr.
ared to be a very reproducible and safe mode
astric stimulation giving a sustained and
level of gastric secretion in the 20 test
ects. When the stimulants were inj. in
le s.c. doses the mean acid output induced
entapeptide in a dose of 7.5 μg/kg was higher
the acid response to histamine in a dose of
g/kg, but this difference was not statisti-
y significant. Peptic ulcer patients showed
gher response to both kinds of stimulant, but the shape of the acid response curve was almost the same as in healthy subjects. The acid response to pentapeptide increased more abruptly and reached a higher level than when histamine was used. The infusion test with pentapeptide had some advantage over histamine stimulation in so far as it was safe and almost completely free of side-effects. It is concluded that the pentagastrin infusion test in a dose of 1.5 μg/kg/hr. is the best mode of stimulation available and can produce the highest rate of gastric secretion in man.

11034 THE INFLUENCE OF GASTRIN ANALOGUES ON GASTRIC, PANCREATIC AND BILE SECRETION. (E.) Konturek, S. (1st Intern. Med. Clin., Cracow, Poland). Acta Med. Pol. 8(2):201-212, 1967.

In cats, the max. gastric acid production (approx. 640 μEq/15 min.) induced by histamine was from a s.c. dosage of 40 μg/kg and this peak was similar to the response to a gastrin tetrapeptide, at a s.c. dose of 20 μg/kg and slightly smaller than the max. acid secretion evoked by gastrin pentapeptide at a s.c. dose of 40 μg/kg. Acid secretion remained unchanged with further increase in dosage but animals exhibited signs of intolerance with supramaximal doses of histamine, but not with the peptides. The shapes of response curves with histamine in cats with gastric fistulas differed slightly from those with the gastrin analogs; with the latter, a sudden increase in acid output was seen almost immediately which peaked in the second 15-min. period, whereas with histamine, the increase started at the end of the first period and peaked in the third or fourth 15-min. period. Both peptides in large rapid i.v. doses failed to produce an inhibitory effect on acid secretion, but always augmented it. Vagotomy reduced the activity of parietal cells to these gastrin-related peptides about twice as much as to histamine. These peptides also increased pancreatic secretion (peaked at 20% above max. secretion), bile flow, and bicarbonate output.

11035 EFFECT OF INSULIN AND 2-DEOXY-D-GLUCOSE ON HCL SECRETION FROM THE NORMAL AND VAGALLY DENERVATED STOMACH. (E.) Konturek, S. (1st Intern. Med. Clin., Cracow, Poland). Acta Med. Pol. 8(2):195-200, 1967.

When dogs with gastric fistulas and vagally-denervated pouches of the fundic gland area were inj. i.v. with 100-200 mg/kg of 2-deoxy-D-glucose or with 0.5-1.5 μg/kg of insulin during basal gastric secretion, an increase proportional to the dose in acid output was recorded from the vagally-innervated stomach which lasted about 2-3 hr. for 2-deoxy-D-glucose and 3-4 hr. for insulin. At the same time, the Heidenhain pouch did not show secretory activity. However, these products produced different responses when the dogs received constant i.v. infusions of histamine at the rate of 5 mg/hr. With 2-deoxy-D-glucose, the histamine induced acid response from the innervated stomach increased about twice as much as when 2-deoxy-D-glucose or histamine alone were used. This increase in gastric secretion lasted more than 6 hr. In contrast, with insulin the histamine-induced gastric secretion was as follows: a slight and transient increase in acid output from the gastric fistula which was followed by a significant reduction in secretion (about 60% of the control) and a decrease to 65% of the control in acid output from the Heidenhain pouch. It is concluded that 2-deoxy-D-glucose would be a more effective tool than glucose for examining gastric vagal innervation and vagal integrity.

11036 EFFECT OF INFUSION OF HISTAMINE IN NORMAL SALINE AND IN GLUCOSE ON GASTRIC SECRETION IN RATS WITH PERMANENT GASTRIC FISTULAS.

(E.) Kowalewski, K. (U. Alberta, Edmonton, Canada). Arch. Int. Physiol. 75(3):450-454, 1967.

Chronic gastric fistula permits the study of both basal and stimulated gastric secretion in small experimental animals, and is practical in the study of gastric function in rats in which a stimulant was infused i.v. for a prolonged period of time. Infusion of histamine in normal saline for 24 hr. in Sprague-Dawley male rats with chronic gastric fistula resulted in an adequate stimulation of gastric secretion. When histamine was infused in 5% glucose no such stimulation was seen. Control animals were infused with saline and glucose. No significant difference was found between gastric secretions of the rats perfused with normal saline and 5% glucose.

11037 ACID SECRETION OF THE STOMACH AFTER MAXIMAL HISTAMINE DOSAGE. (Ger.)

Kaess, H. (Med. U. Clin., Heidelberg, Germany) and E. Oeckinghaus. Klin. Wschr. 45(16):809-814, 1967.

Gastric secretion was measured in four 15-min. intervals during the hr. after admin. of 0.03 mg/kg of histamine dihydrochloride to 207 subjects, (95 males, 112 females) 49 with normal gastrointestinal tracts, 37 with mild superficial gastritis, 49 with severe superficial gastritis, 43 having gastritis with atrophy, and 29 with atrophic gastritis. Biopsy of gastric mucosa was made in each case with a decrease of acid secretion corresponding to increased mucosal atrophy. Except in cases of atrophic gastritis, acid secretion in females was about 70% of that found in male patients. A significant influence of age and wt. on the secretion of gastric acid was found only in males with light superficial gastritis and chronic gastritis with atrophy. The normal range for males with normal mucosa of the gastric body was 10.2 mEq HCl/30 min. and 17.4 mEq HCl/hr.; for females the corresponding values were 7.0 and 12.1 mEq HCl. The wide variation of acid secretion in different histologically-defined conditions limits the value of the augmented histamine test.

11038 RADIOLOGICAL DETERMINATION OF THE ACI LEVEL IN GASTRIC CONTENTS. (Pol.)

Szczepański, J. (Municipal Hosp., Biala Podlaska Poland). Pol. Tyg. Lek. 22(11):383-386, 1967.

A new tubeless method for the determination of free HCl in the stomach is described. It consists of p.o. admin. of a 0.3 g $BaSO_4$ tablet coated with an acid-sensitive agent (prepared from dimethyl-amino-ethyl ester of polymethacry acid) and estimating, by fluoroscopy, the necessary time for disintegration of the coatin in the stomach. The time of reaction between the coating and the free HCl depends on its con in the stomach. The coating is pharmacological inert, nontoxic and does not affect gastric juice or its enzymes. Fluoroscopic examination were started 8-10 min. after swallowing the tablet (whole) and subjects were checked at 2-3 min. intervals; a 3-4 sec. observation of the condition of the tablet was sufficient and the test ended when the time required for complete dissolution of the coating was recorded. The exposure to X-rays using typical values (ki volt and milliampere) and the appropriate filte is insignificant (less than 10% of a chest X-ra This method was tried on approx. 1000 subjects (585 with digestive tract symptoms) and comparisons with values obtained by the usual gastric probe method and titration on 163 subjects showed agreement in 96.94% of cases. The max. differences were 6, 7, 11, 15 and 34 titered acid U corresponding to 0.02%, 0.03%, 0.05% and 0.13% of free HCl, resp. This was attributed t technical mistakes in coating of the tablet.

11039 ADRENALIN EXCITOSECRETORY ACTION IN THE CAT. (Fr.)

Laboury, S. (U. Lieg Belgium). C.R. Soc. Biol. (Paris) 161(2): 485-487, 1967.

Continuous pH recordings were made of gastric acidity as gastric juice was aspirated in 19 cats; epinephrine HCl (200 µg/kg) diluted in saline was infused through the jugular vein; atropine sulfate was inj. i.p., then i.v. 30 min. before, as well as immediately after, the inj. of epinephrine; each time dosage was 1 mg/kg. Cervical bilateral vagotomy was done. The epinephrine produced an immediate drop to pH 3 in 7 of 11 animals; this acid secretion ceased when the epinephrine infusion was interrupted and reappeared after a short latent period when infusion was resumed. The same aci hypersecretion was observed in 2 of 5 cats following separate i.p. inj. of 200 µg/kg of epinephrine. Atropine (1 mg/kg) did not dimini the hyperacidity in all cases but section of th vagus nerves quickly decreased or completely prevented hyperacidity. The admin. of epineph (0.4 mg/kg, total) exceeded the gastric acid secretory action of histamine (100 µg/kg) admi either i.v. or s.c.

11040 RENNIN AND THE GASTRIC SECRETION OF NORMAL INFANTS.

(E.) Malpress, F.

Queen's U., Belfast, N. Ireland). Nature
.ondon) 215(5103):855-857, 1967.

ne secretion of rennin was studied in the
tomachs of young (premature and fullterm; age
ange, birth-6 wk. old) infants, using human
asein as substrate for pepsin and rennin. Sam-
les of gastric juice were aspirated from the
tomachs of both fasting and fed infants.
ctivity was measured by the increase in turbidity
aused by either pepsin or rennin acting on the
ubstrate at pH 5.65; a differential analysis
as based on the different rates of destruction
f the 2 enzymes in mildly alkaline soln. (pH 9)
: room temperature. A total of 22 samples was
xamined: 16 by the method of treatment with
kali (7 from fullterm and 9 from premature
nfants; age range at sampling, 0-31 days); 6 by
urbidimetry at pH 7.2 (1 fullterm and 5 from
remature infants; age range at sampling, 0-43
ays). No rennin activity was detected in any
ample. Nonrennetic activity expressed in terms
f pure pepsin, and uncorrected for dilution by
ilk in the case of fed infants, ranged from none
samples) to approx. 0.005%. The mean value
or 33 samples of gastric juice from human adults
ecently examined by Texter et al. was 0.084%.

041 INHIBITION OF GASTRIC ACID SECRETION
BY BACTERIAL LIPOPOLYSACCHARIDE. (E.)
llie, J. H. (Roy. Coll. Surg. England, London),
M. Limbosch and L. M. Nyhus. Nature (London)
5(5103):879, 1967.

ogs were prepared with vagally denervated pouches
the body of the stomach, and afterward gas-
ric secretion was stimulated by a low dose of
stamine (100 µg/hr.) admin. by constant i.v.
fusion. Gastric acid secretion was abolished
doses of 10 µg/kg of Pseudomonas polysaccharide
rogen admin. i.v. during stimulation with
stamine. Secretion failed progressively over
3 hr. during which time the dogs developed
rexia as indicated by a thermistor lodged in
e rectum. The potent action of lipopoly-
ccharide against secretion stimulated by hist-
nine is likely to reflect an effect on the
cretory mechanism and not on intrinsic or
trinsic nerves; alterations in gastric blood
ow could also be responsible for this effect.
e slow development of inhibition of secretion
these experiments, which seemed to run parallel
th rise in body temperature, suggests that
hibition of secretion, like pyrexia, depends
development of a mediator such as WBC
cterial pyrogen.

042 THE ANTIDIURETIC HORMONE AS AN INHIBITOR
OF GASTRIC SECRETION. (E.) Karlmark,
(U. Uppsala, Sweden) and K. J. Öbrink. Scand.
Gastroent. 2(2):124-128, 1967.

le Heidenhain pouch dogs were employed to study
e antidiuretic hormone as a physiological
hibitor of gastric acid secretion. Constant gastric secretion was stimulated with food; a continuous i.v. infusion of saline at the rate of 0.16 ml/min. was maintained throughout the experiment. When a constant gastric secretion rate had been achieved, pure saline was changed for a saline and antidiuretic hormone mixture (of different conc.) which was infused at the same constant infusion rate of 0.16 ml/min. The inhibition was expressed as a percentage and plotted against the dose of antidiuretic hormone. Lysine- and arginine-antidiuretic hormone were employed; the ED_{50} for both forms of antidiuretic hormone was 60-150 µU/kg; no difference in inhibitory power was found between these 2 forms. During inhibition of gastric acid secretion with antidiuretic hormone, H ion conc. decreased, Na ion conc. increased, Cl ion remained constant in conc. and K ion showed a transient dip during inhibition in every experiment. At 26 µU/kg min. there was evident inhibition of gastric secretion, and at 100 µU/kg min. there was 50% inhibition. A dose of 30 µU/kg min. markedly influenced the gastric secretion, which indicated that this inhibition may well occur under physiological conditions.

11043 INHIBITION BY GASTRONE OF RAT GASTRIC ACID SECRETION MAXIMALLY STIMULATED BY 2-DEOXY-D-GLUCOSE. (E.) Baume, P. E. (Roy. North Shore Hosp., Sydney, Australia) and A. Nicholls. Aust. J. Exp. Biol. Med. Sci. 45(Pt. 3):327-329, 1967.

After a 48-hr. fast, 4 groups of 10 female Sprague-Dawley rats each were subjected to ligation of the pylorus. Group 1 received a control inj. of 2 M urea solvent i.v. in a dose of 2.5 ml/kg. Group 2 received canine antral gastric mucus (gastrone) in a dose of 5 mg/kg contained in 2.5 ml/kg of urea solvent; this dose depresses rat gastric acid secretion 70% from control values. Groups 3 and 4 received the same treatment, resp., as Groups 1 and 2, but received in addition a s.c. inj. of 2-deoxy-D-glucose (600 mg/kg) at the time of pylorus ligation. Acid secretion by the 4 groups was compared. Acid output (mEq/100 g/4 hr.) in each of the groups was as follows: 1) 0.296 ± 0.058; 2) 0.062 ± 0.013; 3) 0.351 ± 0.044; and 4) 0.151 ± 0.018. These results show that the gastrone used was potent and that it could exert its depressant effect in the face of simultaneous stimulation of acid secretion by max. doses of a vagal stimulant; this suggests that gastrone exerts its action on acid secretion at a site in the gastric secretory process distal to the vagus nerves. These results also show that the inhibitory capacity of gastrone is slightly less if 2-deoxy-D-glucose is admin. simultaneously, suggesting that the vagal component acting directly on the secretory mucosa is still operative and that only the antral component of vagally-stimulated secretion is inhibited.

11044 EFFECTS OF CORTISONE ON PARIETAL CELLS AND ACID SECRETION IN DOGS. (E.)

Goksen, Y. (U. Mississippi Med. Ctr., Jackson) and J. D. Hardy. J. Surg. Res. 7(9):406-412, 1967.

The effects of 200 mg of cortisone daily for 3 wk. upon parietal cell mass and gastric secretion were measured in 6 dogs with Heidenhain pouches, 3 with Pavlov pouches and 3 with Heidenhain pouches and antrectomy. The 24-hr. secretory vol., free HCl and total acid were all significantly increased during cortisone treatment in dogs with both innervated and denervated pouches. The antrectomized animals showed a small but statistically insignificant increment in acid secretion on cortisone treatment. The max. secretory response to histamine showed a 2-fold increase during cortisone admin. in the 4 dogs studied. Mean parietal cell population was significantly decreased, 13% in dogs with Heidenhain pouches and 17% in dogs with Pavlov pouches. Since an increased secretion of histamine is usually associated with an increase in parietal cell mass, the rise in gastric acid secretion was attributed to an increased parietal cell sensitivity to normal stimuli in cortisone-treated animals.

11045 EXPERIMENTAL STUDIES ON ACID PRODUCTION OF THE STOMACH STIMULATED BY A SOLUTION OF SOLANINE. (Ger.) Hohnloser, E. (City Hosp., Pforzheim, Germany). Arzneimittelforschung 17(6):738-740, 1967.

Stimulation of gastric-acid production by 0.01% soln. of solanine, a sapanin, was compared to that of a standard alcoholic test-drink. The subjects were divided into 3 groups and only those with completed tests were used in compiling the results: Group 1, 49 subjects each received 250 ml of H_2O containing 50 drops of solanine; Group 2, 27 subjects first underwent the standard alcohol test for acid stimulation and then the solanine test with 50 drops of the sol., and Group 3, 19 control persons were each given 250 ml of water only to test the effect of mechanical stimulation. Collection of gastric juice was done in consecutive 10-min. samples; these were analyzed for total and free acid. Individual variations were observed in both tests. Stimulation was not diminished when solanine was admin. immediately following alcoholic stimulation. Solanine stimulation of total acidity was 43 U, as compared to alcohol (40), and of free acid was 32 as compared to 29 for the alcohol test. The duration of stimulation with solanine seemed to be longer than with alcohol. No side reactions were observed.

11046 DEGRADED AND UNDEGRADED CARRAGEENANS AND ANTIPEPTIC ACTIVITY. (E.) Anderson, W. (U. Strathclyde, Glasgow, Scotland) and J. E. Harthill. J. Pharm. Pharmacol. 19(7):460-467, 1967.

The antipeptic activities of a series of undegraded κ- and λ-carrageenans and degraded carrageenans were examined by 2 biochemical methods (modifications, resp., of Anson, and of Hunt); the activities were found to differ quantitatively. Compared with the κ-carrageenar the λ-carrageenans, as a group, had greater activity and this was associated with low 3,6-anhydro-D-galactose and high ester sulfate content. Within the series of undegraded carrageenans, both κ and λ, differences in antipeptic activity were significantly and positively related to differences in sulfate content. In addition to the effect of sulfate, 3,6-anhydrogalactose content appeared to be inversely related to activity but in the λ-serie only; differences in viscosity were without effect. Initial degradation without loss of sulfate resulted in loss of activity but furthe degradation, also without loss of sulfate, did not reduce activity further. Antipeptic activit appeared to depend on a combination of structura features, of which the differences between κ-λ carrageenans, molecular size and polyanionic properties were aspects.

11047 MEASUREMENT OF GASTRIC HYDROCHLORIC ACID AFTER MAXIMAL HISTAMINE STIMULATION WITH SPECIAL REFERENCE TO ACHLORHYDRIA. (E.) Christiansen, P. M. (Bispebjerg Hosp., Copenhagen). Scand. J. Gastroent. 2(2):105-111, 1967.

Titration to various pH end points was performe in all samples of gastric juice from 208 patien with gastrointestinal diseases and healthy persons, examined with the augmented histamine test. Excluding 27 contaminated with bile and 24 contaminated with food, samples were obtaine from 17 healthy subjects, 22 with prepyloric ulcer, 51 with duodenal ulcer, 26 with gastric ulcer, 13 with gastric cancer, 10 with gastriti 14 with gallbladder disease and 31 with miscellaneous gastrointestinal conditions. Titrat to pH 3.3 and to pH 7.0 revealed differences in H ion conc. which were significantly negatively correlated to the max. acid output, calculated from the acidity at pH 3.3. Differences betwee max. acid outputs, calculated from the aciditie at pH 3.3 and pH 7.0, varied only little in all examined groups, with the exception of gastric juice contaminated with food. Titration to pH or higher was found to be overestimated gastric HCl, especially in gastric juice from patients gastritis and gastric juice contaminated with f These results support previous investigations w recommend titration of gastric juice to pH 3.5 with simultaneous measurement of pH. Achlorhyd corresponding to absence of parietal cells is th defined by a pH higher than 3.5 and a pH fall l than 1 pH U from basal to max.-stimulated value

11048 COMPARISON OF METHODS OF EXPRESSING T RESULTS OF AUGMENTED HISTAMINE TESTS. (E.) Abernethy, R. J. (Western Infirm., Glasgow, Scotland), R. M. Ross, A. G. Cox, A. W. Ka and I. E. Gillespie. Brit. Med. J. 3(5559): 205-206, 1967.

consecutive series of 100 patients with duodenal
cer were studied before and after vagotomy with
simple drainage procedure. Each patient had
augmented histamine test and a medical vago-
my test before operation, and an augmented
stamine test and an insulin test approx. 8-10
ys after operation. The results of all aug-
nted histamine tests were expressed in 3
fferent ways: 1) "mid-half hr.", acid output
the 15- to 45 min. period after histamine; 2)
eak half-hr.", acid output in the 30-min.
riod giving the greatest response after hist-
ine; 3) "whole hr.", acid output in the 60 min.
ter histamine. Each of these methods of report-
g the results was compared with each of the
ners by calculating the correlation coefficient
tween each possible pair. There was an
ceptionally high degree of correlation between
ch pair of measurements in 1) the preoperative
gmented histamine response; 2) the medical
gotomy modification; and 3) the postoperative
gmented histamine response. Similarly, there
s good correlation between the 3 pairs of
asurements when the effects of medical and
rgical vagotomy were expressed as percentage
ductions of the preoperative augmented histamine
sponse. When differences between the results
subgroups of patients within the series were
alyzed, the differences were of the same
gnitude, regardless of the way in which the
sults were expressed. It is concluded that
riations in the method of expressing the re-
lts of the augmented histamine test are unlikely
alter the conclusions derived from a particular
ries of such tests. Therefore, it is likely
at conclusions in studies using different ways
expressing the test responses can be directly
ated with each another.

049 ACTIONS OF HEXOPYRRONIUM BROMIDE ON
GASTRIC SECRETION IN DOGS AND ON GAS-
C SECRETION AND ULCERATION IN RATS. (E.)
hin, R. S. (A. H. Robins Res. Labs., Richmond,
) and J. W. Ward. Arch. Int. Pharmacodyn.
(1):82-100, 1967.

eries of N-substituted-3-pyrrolidyl α-sub-
tuted phenylacetates were tested for their
ects on gastric secretion in rats. One mem-
of this series, hexopyrronium (1-methyl-3-
rolidyl α-phenylcyclohexaneglycolate metho-
mide) was further studied for its effects on
d, histamine and insulin-stimulated gastric
retion. Thomas-type innervated and Heidenhain-
e denervated gastric pouch dogs were used.
effect of this compound on ulceration in the
oric-ligated rat was also assessed. Hexo-
ronium proved to be an effective inhibitor of
tric secretion stimulated by food, insulin
histamine. The gastric secretory effects of
s compound on meal-stimulated secretion did
differ significantly from the results ob-
ned with atropine sulfate. The incidence of
e-effects (dry mouth, mydriasis) was greater
h the admin. of atropine. Hexopyrronium was
o effective in preventing the ulceration
duced by pyloric-ligation in fasted rats.

11050 SECRETION OF ACETYLCHOLINE BY GASTRIC MUCOSA AND ITS QUANTITATIVE CHANGES UNDER THE ACTION OF GANGLERON AND QUATERON. (Arm., Russ. Summ.) Virabian, I. L. Zh. Eksp. Klin. Med. 7(1):13-24, 1967.

The study was made on 3 dogs with Pavlov's pouch constructed from the lesser and greater curvatures. Acetylcholine extracted by trichloracetic acid was subsequently tested on the rectus abdominis muscle of the frog. Under the action of small doses of quateron [thriethyl (3-hydroxy-2-methylbutyl)-iodide, p-butoxybenzoate ammonium], the most significant increase in acetylcholine concn. was noted in the gastric juice (collected for 3 hr.) from the lesser curvature. The shifts in pepsin activity and free acid were less pronounced. Acetylcholine content under the influence of quateron (0.05 mg/kg) on stimulation with bread increased by 115.7% and with meat by 65%; pepsin increased by 39.8 and 47.6%, resp.; acid increased by 31.4 and 23.5%, resp.; gastric juice vol. increased by 37.1 and 29.3%, resp. In the secretion from the greater curvature on stimulation with bread, acetylcholine content increased by 42.3%, pepsin activity by 23.1%, acidity by 8.1%; and vol. by 8.1%; the resp. values on stimulation with meat were 28.5%, 11.0%, 12.6%, and 4.1%. Quateron in larger doses intensely inhibited acetylcholine content in the juice obtained from the lesser curvature; other indices showed less-pronounced shifts. Acetylcholine content on stimulation with bread and meat decreased by 61 and 60%, resp.; pepsin activity was inhibited by 56 and 64%, resp.; acidity by 46 and 45.9%, vol. by 50.8 and 50.3%, resp. In the juice from the greater curvature the resp. values were 42 and 65%, 47 and 65%, 40.7 and 49.9%, 45.9 and 50.3%. Gangleron (3-diethylamino-1, 2-dimethylpropyl p-isobutoxybenzoate) in larger doses markedly reduced the content of acetylcholine and other indices of gastric juice. Therefore, ganglion blocking agents have a pronounced effect on the acetylcholine content in the gastric juice. Apparently the changes occurring in acetylcholine metabolism are important in the mechanism of the therapeutic effects of quateron and gangleron.

11051 THE EFFECT OF PIPENZOLATE ON GASTRIC SECRETION IN MAN. (E.) Vincent, P. C. (Roy. North Shore Hosp., Sydney, Australia), B. H. Fenton and D. Beeston. Med. J. Aust. 1(11):546-548, 1967.

The following drugs were admin. p.o. to 2 patients undergoing insulin coma therapy 3 hr. before gastric secretion was measured: propantheline, 15 and 30 mg; oxyphencyclimine, 10 mg; and pipenzolate, 10 and 20 mg. The recommended doses (10 mg p.o.) of pipenzolate had no effect on saliva flow or hypoglycemic-stimulated gastric secretion, although larger doses had a slight effect. In the same subjects, both 30 mg of propantheline and 10 mg of oxyphencyclimine significantly inhibited gastric secretion. These results cast doubt on the therapeutic value of this preparation, in the doses recommended, in the treatment of peptic ulceration.

11052 RADIOAUTOGRAPHIC LOCALIZATION OF THE INCREASED SYNTHESIS OF PHOSPHATIDYLINOSITOL IN RESPONSE TO PANCREOZYMIN OR ACETYLCHOLINE IN GUINEA PIG PANCREAS SLICES. (E.) Hokin, L. E. (U. Wisconsin, Madison) and D. Huebner. J. Cell Biol. 33(3):521-530, 1967.

A technic in which the incorporation of tritium from myo-inositol-2-3H into phosphatidylinositol is followed by radioautography is studied. This permits the measurement of the incorporation of myo-inositol-2-3H into the lipid in various regions of the guinea pig pancreatic acinar cell. Stimulation of enzyme secretion with either pancreozymin or acetylcholine was associated with increased graining in both the basophilic and nonbasophilic cytoplasm. Most of the increase in graining due to stimulation with pancreozymin or acetylcholine plus physostigmine was abolished if the tissue was extracted with 2:1 chloroform-methanol before radioautography. On chromatography of lipid extracts of pancreas, the only lipid showing a detectable increase in radiography on stimulation with pancreozymin was phosphatidylinositol. The increase in graining is likely to be due to increased incorporation of tritium into phosphatidylinositol. There seems to be an increased synthesis of phosphatidylinositol in the rough-surfaced endoplasmic reticulum and in the smooth-surfaced Golgi membranes as a result of stimulation of enzyme secretion. The significance of these findings is discussed in relation to membrane circulation presumed to occur in the pancreatic acinar cells on stimulation of protein secretion. The increased synthesis of phosphatidylinositol may be concerned with the formation of new endoplasmic reticulum and with the Golgi membrane to replace that which is assumed to be converted to membrane of the zymogen granules during intracellular protein transport.

11053 THE PRESENCE OF BETA-RECEPTORS IN THE SUBMAXILLARY GLAND OF THE DOG. (E.) Emmelin, N. (U. Lund, Sweden) and J. Holmberg. Brit. J. Pharmacol. 30(2):371-378, 1967.

In dogs under chloralose-urethane anesthesia, secretion from the submaxillary gland evoked by stimulation of the vagosympathetic trunk was not affected by dihydroergotamine, but the vasoconstrictor response in the gland was abolished. Isoprenaline, admin. i.v., evoked a lively secretion from the gland, similar to that produced by sympathetic stimulation; the threshold dose was 0.5-2.0 μg/kg, and after 5-10 μg/kg a flow approx. as rapid as that caused by sympathetic stimulation at 20 shocks/sec. was produced. With epinephrine, a flow could be produced by inj. 5-10 μg/kg. These agents caused no flow of saliva from the parotid or sublingual glands. The secretory effects of a moderate dose of isoprenaline and epinephrine could be completel abolished by propranolol (0.5 mg/kg) or N-isopropyl-p-nitrophenylethanolamine (5 mg/kg). The secretion induced by vagosympathetic stimulation was more resistant, but it could be abolished when the doses of the blocking agents were raised 2-5-fold. It is concluded that the catecholamine-receptors of the submaxillary gla cells in the dog belong exclusively to the β-type. In this respect, this gland differs from all other salivary glands so-far investigated.

11054 THE EFFECT OF STIMULATION OF THE GYRU ZONE AND AMYGDALOID NUCLEI ON THE SECRETORY ACTION OF SALIVARY AND GASTRIC GLANDS (Ukr.) Bogach, P. G. (U. Kiev, USSR) and Nguye Ting Tsao. Fiziol. Zh. (Kiev) 12(4):452-457, 1966.

Using 9 dogs prepared with fistulas of the mix salivary glands according to Pavlov-Glinsk and gastric fistulas according to Basov, it was fo that structures of the anterior gyrus zone and the amygdaloid nuclei (using stimulation with sinusoidal current of 0.1-1.5 milliamperes) participated in the regulation of the secretor function of salivary and gastric glands, and also in the secretion of gastric mucus. Stimu tion of the anterior gyrus zone with a current up to 1.0-1.5 milliamperes did not provoke sec tion from the salivary glands, but it caused secretion of a significant amount of gastric mucus. When secretion of an acid gastric juic preceded stimulation of the anterior gyrus zon stimulation stopped juice secretion and induce the secretion of gastric mucus. This stimulat markedly inhibited the histamine-induced secre tion of gastric juice and reduced its free- an total acidity (dogs received 0.0001 g/kg of histamine s.c., before or after stimulation). Therefore, stimulation of the anterior gyrus zone had no effect on salivation, inhibited secretory action of gastric glands, decreased the quantity of secretion, decreased acidity o the gastric juice and stimulated secretion of gastric mucus. A low stimulation (0.1-0.2 milliamperes) of the amygdaloid nuclei resulte in secretion of a significant quantity of sali and gastric mucus with a high lysozyme activit Brief stimulation of the amygdaloid nuclei by current of 0.5-0.7 milliamperes caused secreti of saliva and acid gastric juice with high enzymatic activity. Acid gastric juice was secreted after stimulation was discontinued, with max. secretion occurring in the interval between 15-45 min. after stimulation. Salivat reactions, which developed during stimulation the amygdaloid nuclei, were dependent upon the duration, force and frequency of the current employed. The greatest effects on salivation and the highest content of organic compounds i saliva were noted at a frequency of 40-60 hert and a force of 0.3-0.5 milliamperes. Prolonge stimulation by sinusoidal current provoked a

eater salivation during the first minute, which
en gradually decreased and ceased after 10-11
n.

055 GASTRIC SECRETION OF ACID AFTER INTRA-
VENOUS INFUSION OF HISTAMINE IN LARGE
SES. (E.) Dotevall, G. (Sahlgren's Hosp.,
teborg, Sweden) and A. Walan. Acta Med. Scand.
1(4):439-444, 1967.

histamine-infusion test with histamine (0.0084-
2520 mg/kg/hr.) admin. in increasing doses was
rformed on 18 patients with peptic ulcer for
e determination of the dose-response curve for
l produced by the stomach. The results were
mpared with secretory data obtained from the
me patients studied with the augmented histamine
st according to Kay, in which 0.024 mg of hist-
ine dihydrochloride was given. A half hr. before
stamine stimulation 100 mg of the antihistamine
tazoline was admin. i.m. The acid output was
atistically significantly higher with the
stamine-infusion test than with the Kay test.
e histamine-infusion test is simple and may be
value in studying the inhibitory effects of
fferent drugs on gastric secretion. This study
so corroborates the finding that the augmented
stamine test according to Kay does not give a
x. acid output with histamine as the only
imulator.

056 EFFECT OF STEROIDS ON GASTRIC MUCOSAL
STRUCTURE AND FUNCTION IN PERNICIOUS
EMIA. (E.) Rødbro, P. (Glostrup Hosp., Copen-
gen), H. Dige-Petersen, M. Schwartz and O. Z.
lgaard. Acta Med. Scand. 181(4):445-452, 1967.

ghteen patients (8 male, 10 female; mean age,
yr., with a range of 47-79) with Addisonian
rnicious anemia in remission were treated with
ednisone for 6 wk., 20 mg/day for 3 wk. and
mg/day for 3 wk. Before treatment 10 had
rietal cell antibody and 11 had intrinsic factor
tibody in serum. All patients were anacidic
fore and after treatment. The mean values for
cretory vol., conc. and hourly output of non-
trinsic factor vitamin B_{12}-binding capacity
fore and after steroid treatment were not sig-
ficantly different in either the basal or
imulated (histamine) periods. Before treatment,
very low mean conc. of intrinsic factor in
stric juice was found, and the hourly output in
e post-histamine hr. was below 100 U in all
ses; after treatment, there was a rise in in-
insic factor production sufficient for a normal
tamin B_{12}-absorption in 7 patients. A pre-
eatment biopsy study showed 3 patients with severe gastric atrophy, and 13 had a more or less pronounced atrophic gastritis, classified as moderate atrophy. After steroid treatment, the same picture of atrophic gastritis or gastric atrophy was noted, but 9 of 18 patients had normal gastric glands containing parietal cells in the atrophic mucosa. A fall in intrinsic-factor antibody titer of at least 20% of the value before treatment was found in 6 of 11 patients who had intrinsic-factor antibody in serum before treatment. A change in parietal cell antibody reaction from positive to negative or doubtful, regarded as a positive steroid effect on this antibody, was found in only 1 of 10 patients who had this antibody in their serum before treatment. The effect of steroids on gastric function and structure was in part found independently of gastric antibodies, which may well be a secondary phenomenon. It is doubtful that the finding of gastric antibodies constitutes support for the concept of pernicious anemia as an auto-immune disease.

11057 GASTRIC SECRETION AND ITS RELATION TO AGE AND SEX. (Ger.) Hradský, M. (Charles U., Hradec Kralove, Czechoslovakia), J. Groh, F. Hamáček and L. Kustová. Sborn. Ved. Prac. Lek. Fak. Karlov. Univ. 10(2):211-222, 1967.

11058 GASTRIC SECRETORY FUNCTION IN ONTOGENESIS AND ITS CHANGES IN THE NORMAL AND PATHOLOGIC STATE. (Rus.) Uspenskii, Iu. N. Moscow, Meditsina, 1966, 170pp.

11059 STUDY OF GASTRIC SECRETORY ACTIVITY BY MODERN METHODS. (Rus.) Umanskii, S. Sh. and V. I. Riatsen. Klin. Med. (Moskva) 45(8):82-86, 1967.

11060 COMPARATIVE STUDY OF SECRETION OF INTESTINAL AND GASTRIC GLANDS DURING EMOTIONAL EXCITEMENT. (Uk.) Maevs'ka, N. V. (Donetsk Med. Inst., USSR). Fiziol. Zh. (Kiev) 13(3):408-411, 1967.

11061 EFFECT OF VAGOTOMY ON SECRETION. (It.)(Rev.) Speranza, V. (U. Rome) and A. Cirenei. Chir. Gastroent. (Roma) 1(2 Suppl.):272-277, 1967.

11062 NERVOUS CONTROL OF THE EXCHANGE OF NUCLEIC ACIDS AND PHOSPHATE LIPIDS IN THE TISSUE OF THE PANCREAS DURING SECRETION. (Pol.) Szostakowska, I. W. Ann. Univ. Curie Sklodowska [Med.] 20:349-363, 1966.

See also abstract nos.: 11444,11670,11931

11063 MOLECULAR WEIGHT AND AMINO ACID COMPOSITION OF HUMAN GASTRICSIN AND PEPSIN. (E.) Mills, J. N. (U. Oklahoma Sch. Med., Oklahoma City) and J. Tang. J. Biol. Chem. 242(13):3093-3097, 1967.

Molecular wt. for human pepsin and gastricsin were approx. 34,000 and 31,500, resp., as determined by the sedimentation-diffusion method, amino acid analysis data and sedimentation equilibrium studies. The sedimentation coefficients were found to be 3.14 Svedberg U for human pepsin and 3.32 Svedberg U for gastricsin. The sedimentation coefficient for gastricsin was conc.-dependent. The diffusion coefficients were found to be 8.7×10^{-7} cm^2 sec.$^{-1}$ and 9.6×10^{-7} cm^2 sec.$^{-1}$ for human pepsin and gastricsin, resp. The partial specific vol. calculated from the amino acid compositions were 0.724 ml/g for human pepsin and 0.724 ml/g for gastricsin. The amino acid composition of human pepsin was very similar to that of porcine pepsin. Human pepsin contained a significantly higher number of aspartic acid, isoleucine and serine residues than gastricsin, while the latter contained a significantly higher number of glutamic acid residues.

11064 PURIFICATION AND PROPERTIES OF PORCINE GASTRICSIN. (E.) Chiang, L. (U. Oklahoma Sch. Med., Oklahoma City), L. Sanchez-Chiang, J. N. Mills and I. Tang. J. Biol. Chem. 242(13):3098-3102, 1967.

The proteolytic enzyme, gastricsin, was isolated from an acidified extract of porcine gastric mucosa. The purification procedure consisted of ammonium sulfate precipitation followed by chromatography on columns of Amberlite CG-50 and Sephadex G-75. The enzyme preparation was found to be homogeneous on ultracentrifugation and electrophoresis. The enzymatic properties of porcine gastricsin, including optimal pH, hydrolysis of synthetic and protein substrates, milk-clotting activity and stability in an alkaline soln., were similar to those of the human gastricsin. Molecular wt. of porcine gastricsin was found to be 32,500. The amino acid composition of porcine gastricsin was similar to that of human gastricsin, and differed significantly from those of human and porcine pepsin.

11065 pH AND CONCENTRATION OF PANCREATIC ENZYMES IN ASPIRATES FROM THE HUMAN DUODENUM DURING DIGESTION OF A STANDARD MEAL IN PATIENTS WITH INTESTINAL DISORDERS. (E.) Worni H. (Blegdam Hosp., Aalborg, Denmark), S. Müllert E. H. Thaysen and H. O. Bang. Scand. J. Gastroe 2(2):81-89, 1967.

In 41 patients, intestinal contents were aspirat in 4 subsequent periods of 20 min. each after ingestion of a standard meal; the vol., pH and conc. of α-amylase, trypsin, chymotrypsin and lipase were determined in the collections. The patient material included 25 patients (13 men, 12 women) with gluten-induced enteropathy(including 5 with intestinal diverticula, 4 with regional enteritis, 3 with intestinal resection and 1 each with intestinal lymphosarcoma, Whipp disease, exudative jejunitis and intestinal lymphatic blockage and 16 with miscellaneous intestinal disorders). Only minor deviations from normal pH-levels were noted. In both grou of patients, lipase secretion, and to a minor degree that of amylase, were more markedly reduced than the secretion of the proteolytic enzymes. With the exception of the values of trypsin, conc. of enzymes were seen to be below the lowest normal value in approx. a third of the patients throughout the period of digestion It is concluded that the pancreatic function wa genuinely reduced in several patients with ente enous malabsorption, and that this may be expla as a nonspecific effect of malabsorption.

11066 PURIFICATION AND SOME PROPERTIES OF TH CATHEPSIN FROM THE SMALL INTESTINAL MUCOSA OF PIG. (E.) Kregar, I. (Stefan Nucl. Inst., Ljubljana, Yugoslavia), V. Turk and D. Lebez. Enzymologia 33(2):80-88, 1967.

11067 ENZYMATIC ACTIVITY OF A PEPTIDE OBTAINED BY AUTODIGESTION OF PEPSIN. (It.) Marpillero, C. Friuli Med. 22(2):325-332 1967.

See also abstract no.: 10983

MOTILITY

68 A METHOD FOR THE STUDY OF SPASMOLYTICS
IN VIVO ON THE ELECTRICALLY STIMULATED
BIT JEJUNUM. (Fr.) Lévy, J. C. (Albert-
land Lab., Chilly-Mazarin, France) and D.
Fel. Therapie 22(2):397-402, 1967.

rabbits (2.5-3.0 kg) anesthetized with
than were operated upon and a portion of
act jejunum was brought out (with unimpaired
od supply). A wire was used to support the
ion and it connected with a stylus; another
which was attached to this first one was
nected to a square-wave generator. A trocar
inserted s.c. into the flank of the animal
connected by wire to the other output post
he generator. A double-walled chamber, open
he top center for the connecting wire to the
us, surrounded the incision and body tempera-
of the preparation was maintained by circula-
of H_2O between the walls of the chamber which
retained H_2O in the tissues. The experimental
tem was calibrated at different square-wave fre-
ncies (10, 20, 50, and 100 cycles/sec. at 5, 10,
and 20 volts). Known spasmolytic substances
as atropine, papaverine, Novosparol, dipro-
ene and 1-n-butylscopolammonium bromide were
ted by i.v. and parenteral routes. Active
molytic agents reduced the amplitude of con-
tion. Thus atropine was active at 50 µg/kg
was 50% effective at 100 µg/kg; e.g., it re-
d the amplitude to 50%. Papaverine (10 µg/kg)
sed reduction of the amplitude by 50%. Atropine
active at a dose of 2 mg/kg parenterally. 1
-Butylscopolammonium bromide was active at a
of about 40 mg/kg. The active dosages are
rly higher than those found in vitro. The
ve doses/kg in the animal are about the size
he usual human dosages.

69 AN ANALYSIS OF THE SYMPATHOMIMETIC
EFFECTS OF ACETYLCHOLINE ON THE RAT
UM. (E.) Gokhale, S. D. (Med. Coll., Baroda,
a), O. D. Gulati and D. I. Panchal. Brit. J.
rmacol. 30(1):35-45, 1967.

ated ileal segments from starved, healthy
were suspended in a bath containing hyoscine
g/ml) at 37°C. Distinct, dose-related in-
tion of ileal tone and movement resulted from
ylcholine admin. in conc. of 4-8 µg/ml. Fur-
evaluation of acetylcholine activity was con-
ted employing a drug conc. of 6 µg/ml. Pron-
lol (5 µg/ml) or phentolamine (10 µg/ml)
ially inhibited acetylcholine response, whereas
ther they totally inhibited ileal response to
ylcholine. Bretylium, guanethidine and xylo-
ine, all in conc. of 20 µg/ml, blocked acetyl-
ine inhibition, but such inhibitory action
lf was blocked by admin. of dexamphetamine
methylamphetamine. Pretreatment with re-
ine blocked the effect of acetylcholine, which
then restored by norepinephrine admin.
g/ml). In addition, fully restored acetyl-
ine response was blocked by bretylium, xylo-
ine and guanethidine. Hexamethonium (10 µg/ml), pempidine (5 µg/ml) and mecamylamine (5 µg/ml) potentiated the effects of both acetylcholine and norepinephrine, but fully inhibited nicotine responses. Cocaine (10 µg/ml) did not affect acetylcholine response. These findings demonstrate the similarity between acetylcholine admin. and sympathetic stimulation in the rat ileum and suggest a cholinergic link between the sympathetic impulse and norepinephrine release.

11070 AN ANALYSIS OF THE AUTONOMIC CONTROL OF GASTROINTESTINAL MOTILITY IN THE CAT. (E.) Neely, J. (St. Bartholomew's Hosp., London) and B. N. Catchpole. Gut 8(3):230-241, 1967.

When cats were infused with neostigmine at a slow rate to stimulate gastrointestinal motility, the colon was most sensitive to the drug, the stomach less so, and the small intestine least. Under neostigmine stimulation there was no significant difference in the inhibitory effects of norepinephrine on these 3 areas. However, the colon was most sensitive to isoprenaline, the stomach less and the small intestine least. In cats which received an α-adrenergic blockade (phenoxybenzamine) prior to neostigmine, the small intestine became more sensitive to the latter drug and the colon more resistant relative to the stomach. Use of β-adrenergic blockade (propranolol) did not greatly alter the response to neostigmine. After phenoxybenzamine and atropine, the infusion of propranolol produced an almost consistent increase in colonic activity, but had less effect on the small intestine and virtually none on the stomach. Blockade of the sympathetics with guanethidine increased the activity of the small intestine even in the presence of β-adrenergic block. The vagotomized stomach was resistant to the action of physostigmine; the resistance of the small intestine and colon were increased. It is concluded that the stomach has a high level of extrinsic and a low level of intrinsic cholinergic control; both α and β-adrenergic receptors are present; the small intestine has a low level of extrinsic control and an intrinsic cholinergic control with sympathetic mediation mostly through α-receptors; and the colon has a low degree of cholinergic control and a sympathetic inhibition mediated mainly by β-receptors.

11071 DIRECT AND INDIRECT STIMULATION OF THE INTESTINES IN PATIENTS WITH TRAUMATIC SEVERANCE OF THE SPINAL CORD. (Rus.) Vishnevskii, A. A. (Vishnevsk Inst. Surg., Moscow), A. V. Livshits and B. I. Khodorov. Eksp. Khir. Anest. 12(3):8-11, 1967.

Direct and indirect stimulation of the intestine was studied in 2 men (19 and 20 yr. old) with complete traumatic interruption of the spinal cord 7 and 6 mo. earlier, resp. In 1 of the 2 patients surgery was concluded by implantation of a radio frequency receiver under the abdominal wall and by platinum electrodes introduced in the bladder. In the other, a negative electrode was induced into the rectum and a positive one placed on the abdominal wall. Electric stimulation of the bladder (10-15 volts, 1 msec., frequency 20 cycles/sec.) caused stimulation of intestinal peristalsis and restoration of the act of defecation. Direct stimulation of the intestine with electric impulses (10-30 volts, 5-7 msec., 10-20 cycles/sec.) led to stimulation of intestinal peristalsis, manifested by an increase of motility and electric activity. Indirect and direct electric stimulation of the intestine provoked reflex activation of the parasympathetic nervous center which regulates intestinal peristalsis.

11072 BEHAVIOR OF THE INTERSTITIAL TEMPERATURE IN EXPERIMENTS ON MECHANICAL INTESTINAL OCCLUSION. (Pol.) Tołłoczko, A. (First. Surg. Inst., Acad. Med., Bialystok, Poland) and A. Obrzut. Przegl. Lek. 22(6):465-468, 1966.

The decrease of interstitial temperature in the small intestine during experimentally-induced occlusion was measured in 10 dogs. In 30 cm of exposed small intestinal loop a segment was tied off in 2 places to create an occlusion; air was introduced through a cannula and the air pressure measured with a manometer. Temperature was measured within 30 min. of exposure while the surrounding temperature was kept at 25-30°C. The electrodes of the thermometer were applied interstitially in the muscular layer of the intestinal wall. Measurements were made every min. for 10 min. varying the intraintestinal pressure between 10 and 40 mm Hg and also after release of the pressure. The i.m. temperature of the small intestine decreased 0.6-4.7°C within 1-6 min. depending on the amount of pressure applied. Temperature returned to normal 2-8 min. after removing the intestinal pressure. It is suggested that the speed with which the temperature decreased indicates that extensive disruption of the capillary circulation occurs even during mild dilatation of the small intestine.

11073 STUDIES ON THE VOMITING CENTER; THE LOCALIZATION OF THE RETCHING RESPONSIVE AREA IN THE MEDULLA AND PONS. (E.) Kimura, N. (Hiroshima U. Sch. Med., Japan). Hiroshima J. Med. Sci. 15(2):171-178, 1967.

Retching movements in response to electrical stimulation were recorded in 23 dogs as internal pressure variations of the stomach and distal colon, and systemic blood pressure was simulaneously recorded in the right common carotid artery. Retching was followed by changes in systemic blood pressure (rise or fall) and the increase or decrease in the peristaltic movement of the stomach and distal colon, but no correlation between retching and other autonomic reactions could be determined. Retching was induced both in the anesthetized dog and in the nonanesthetized decerebrated dog; retching was also elicited in the vagotomized dog and also in the spinal dog whose spinal cord was transected between the cervical and thoracic region. A total of 45 retching responsive points were found in the medulla oblongata; these were the dorsolateral nucleus of the vagus nerve (10 points), dorsomedial nucleus of the vagus nerve (9 points), nucleus of the medial solitary tract (4), nucleus of the inferior solitary tract (4), nucleus of the lateral solitary tract (3), the tractus solitari (6), reticular formation (7), internal arcuate fibers (1) and nucleus intercalatus (1). Only 3 retching points were found in the pons; these were the lateral vestibular nucleus, rubrospinal tract and fibers of the vagus nerve. The latte finding suggests that the medulla oblongata is more responsible than the pons as the retching center.

11074 RELEASE OF 5-HYDROXYTRYPTAMINE FROM ISOLATED DOG INTESTINE BY NICOTINE. (E.) Burks, T. F. (U. New Mexico, Albuquerque) and J. P. Long. Brit. J. Pharmacol. 30(2):229-239, 1967.

The release of 5-hydroxytryptamine from dog small intestine segments perfused with Krebs bicarbonate soln. was enhanced by both nicotine and dimethylphenylpiperazinium; these agents al initiated contractions of the intestinal smooth muscle. The enhanced 5-hydroxytryptamine relea and intestinal contraction produced by nicotine and acetylcholine were significantly antagonize by atropine. Perfusion of the isolated intesti sections with Ca-free soln. reversibly abolishe the smooth muscle responses to nicotine and diminished responses to 5-hydroxytryptamine and morphine; there was a smaller but still signifi diminution of the responses to acetylcholine. The increase in intestinal motility by 10 µg of nicotine and 2 µg of dimethylphenylpiperazinium was not antagonized by 100 µg of hexamethonium; there was an insignificant increase in the response to nicotine after treatment with hexamethonium. Both nicotine and dimethylphenylpiperazinium were significantly antagonized on the isolated intestinal sections by 500 µg dose of nicotine. The ability of 100 µg of hexamethonium to depress the parasympathetic gangli in an in situ intestinal section was shown by locally antagonizing intestinal responses to vagal stimulation. Nicotine and dimethylphenyl piperazinium could have enhanced release of 5-hydroxytryptamine and intestinal motility in th preparation by stimulation of extraganglionic nervous structures, by direct action on the cholinergic receptors or, perhaps more likely, stimulating a population of ganglion cells whic are exceptionally resistant to hexamethonium blockade.

11075 EFFECT OF HEMORRHAGE-INDUCED ANEMIC HYPOXIA ON PROPULSIVE MOTILITY OF THE SMALL INTESTINE IN CATS. (E.) Li, Y.-S. (Nat. Taiwan U., Taipei) and H.-S. Fang. J. Formosa Med. Ass. 66(6):308-311, 1967.

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ts previously fasted for 24 hr. were subjected 2 experimental procedures using the charcoal- rker method. In Procedure A, a charcoal mixture s admin. by stomach tube; 5 min. after this the imal was anesthetized with nembutal i.v. and bjected to a massive hemorrhage (removal of 40% the blood vol.); after 40 min. the animals re sacrificed and the distance which the charcoal xture had traversed the small intestine was asured. In Procedure B, the cats were first esthetized and the charcoal-mixture was inj. rectly into the proximal duodenum after it had en exposed at laparotomy. These animals were en subjected to massive hemorrhage (removal of % of the blood vol.), and 2 hr. after charcoal j. the animals were sacrificed. With both ocedures the control animals were treated entically, except that no hemorrhage was induced. e charcoal mixture moved much more quickly along e small intestine in animals treated by Procedure than by Procedure B. Severe anemic hypoxia oduced a reduction in motility to an av. of 32% the intestine traversed in Procedure A, compared 48% for controls treated by this procedure; those treated with Procedure B, motility was duced to 17% of the intestine traversed, as mpared to 36% in controls treated with this ocedure. Thus, hemorrhage-induced anemic poxia caused a significant decrease in intestinal opulsive motility of the cat. These results ffer from those obtained in the dog by other vestigators in which hemorrhage-induced anemic poxia caused an increase in propulsive motility the small intestine.

076 FORCE IN THE ANAL CANAL AND ANAL
CONTINENCE. (E.) Collins, C. D. (Roy.
firm., Sheffield, England), H. L. Duthie, T.
elley and G. E. Whittaker. Gut 8(4):354-360,
67.

17 normal fully-continent subjects (all male; -70 yr. old), the radial force exerted by ueezing of the anal sphincters and pressure in e anal canal were measured at the same time as ectrical activity in the external anal sphincter. l 3 parameters gave similar responses at rest, coughing or voluntary squeeze of the perianal scles. On a Valsalva maneuver, the changes in rce were less than those of pressure, especially the upper anal canal. When the rectum was stended with a balloon, the well-known decrease pressure in the anal canal was not accompanied any definite change in force. On the basis of ese results, it is suggested that mechanical ctors rather than muscular relaxation may play important part in the responses in the anal nal.

077 A STUDY OF THE INNERVATION OF THE
TAENIA COLI. (E.) Bennett, M. R.
. Melbourne, Australia) and D. G. Rogers. J.
ll Biol. 33(3):573-596, 1967.

e anatomical features and the electrophysiological tivity of the guinea pig taenia coli was studied. Changing the membrane potential of single cells cannot modulate the rate of firing action potentials although electrical coupling between the cells during propagation occurred. The amplitude of the junction potentials which occur during transmission from inhibitory nerves was not affected, thus indicating electrical coupling during transmission. The taenia coli is composed of smooth muscle bundles which anastomose. Tight junctions between cells in the bundles supply a pathway for the electrical coupling. Smooth muscle cells toward the serosal surface have an extensive intramural inhibitory innervation, although a weak sympathetic inhibitory and cholinergic excitatory innervation exists. These data agree with the distribution of these nerves as determined histochemically. The only muscle cells which undergo permeability changes during transmission are those adjacent to varicosities in the nerve bundles. This conclusion is due to the fact that single axons are rarely observed in the taenia coli. It is assumed that the remaining muscle cells then undergo potential changes during transmission because of electrical coupling through the tight junctions.

11078 BIOELECTRIC REACTIONS OF HYPOTHALAMIC
REGION BY CHEMICAL STIMULATION OF
SMALL INTESTINE RECEPTORS. (Rus.) Udalova, G. P.
Nerv. Sist. (Leningr.) (7):83-88, 1967.

In 14 rats the small intestine was stimulated by NaCl soln. (2.5-15% soln.) or HCl (0.25-1.0% soln.) inducing changes in the bioelectric activity of the hypothalamus. The clearest reaction was observed in the region of the ventro-medial nucleus. NaCl (5-15%) or HCl (0.5-1.0%) evoked potentials with initial positive, and, subsequently, slower negative phases, 0.2-0.5 sec. after entrance into the intestinal loop; its duration was 100-200 msec., and the amplitude was 50-80 μvolts. Such potentials could be absent during repeated stimulations; 1.5-5.0 sec. after initiation of admin., of soln. a series of 3-7 potentials arose followed by intervals of 2-10 sec. In this series, in addition to biphasic potentials, also single (more often positive) and multiphase potentials were noted with an amplitude of 100-200 μvolts and a duration of 150-500 msec. NaCl (2.5%) and HCl (0.25%) in lower conc. caused no evident changes or, gave a slight effect, and had no effect on the electrical activity of the hypothalamus. The type of response depended upon the depth of narcosis, pentobarbital-Na, conc. of soln., duration of their presence in the intestinal loop, and also on the sequence of the use of stimulants. Under light narcosis, stimulation with NaCl or HCl was followed by only basic changes of hypothalamic activity, while after deep narcosis, basic changes and the above potentials were found. Presence of the soln. in the intestinal loop for 20-60 sec. caused a reaction while a more prolonged stay caused weakening of the stimulation.

Repeated admin. of the soln. (3-4 times) weakened the response in the electrical activity of the hypothalamus; however, repeated action of chemical stimulants and washing with physiological soln. caused (after 5-6 admin.) an irregular rhythmic sequence, variations in amplitude and frequency, and the appearance of spontaneous potentials similar to those which appeared after the use of NaCl or HCl. Admin. of physiological soln. did not induce these potentials; if physiological soln. was given immediately after the appearance of potentials (on admin. of NaCl or HCl), they disappeared. This difference in reaction to NaCl or HCl and physiological soln. disappeared during deep narcosis. Procaine (0.5-1.0%) temporarily removed the response in the electrical activity of the hypothalamis, of the action of chemicals on intestinal receptors. The response, under conditions of simultaneous recording, was less significant in the preoptic region than in the ventromedial nucleus. Response to NaCl or HCl in the lateral region of the hypothalamus was very low or absent and the reaction of the mamillary bodies on stimulation was not clear. Mechanical stimulation in the form of a single inflation of the intestine had no effect or response occurred only at the start of inflation; no potential series was shown.

11079 SONIC CORRELATES OF HUMAN DEGLUTITION. (E.) Logan, W. J. (NIH, Bethesda, Md. J. F. Kavanagh and A. W. Wornall. J. Appl. Physiol. 23(2):279-284, 1967.

11080 ENDOGENOUS CHOLECYSTOKININ AND THE CONTRACTION OF THE GALLBLADDER. (Jap. Ariyama, J. (Juntendo U. Sch. Med., Japan). Nippon Naika Gakkai Zasshi (J. Jap. Soc. Intern. Med.) 56(3):252-259, 1967.

11081 PERIODIC ACTIVITY OF THE STOMACH AND DUODENUM. (Rus.) Grigor'ev, V. G. (Inst. Nutr., Moscow). Klin. Med. (Moskva) 45(8):26-33, 1967.

11082 SMALL INTESTINAL PASSAGE OF RADIOGOLD COLLOID. (Ger.) Georgi, P. (Cancer Res. Inst., Berlin), H. J. Altenbrunn and H. J. Gütz. Radiol. Diagn. (Berlin) 8(3):285-289, 19

See also abstract no.: 11281

)83 EFFECT OF BILIARY DRAINAGE ON INDIVIDUAL
REACTIONS IN THE CONVERSION OF CHOLESTEROL
TAUROCHOLIC ACID. BILE ACIDS AND STEROIDS 180.
) Danielsson, H. (Karolinska Inst., Stockholm),
Einarsson and G. Johansson. Europ. J. Biochem.
):44-49, 1967.

effect of biliary drainage on incorporation
acetate into cholesterol and on 4 different
yme systems in the metabolic pathway from
lesterol to taurocholic acid was studied in
ogenates of liver from male Sprague-Dawley rats.
homogenates of liver taken from bile fistula
s, 48 hr. after operation, the extent of in-
poration of acetate into cholesterol was approx.
fold greater and the extent of 7α-hydroxylation
cholesterol approx. 8-fold greater than in
ogenates of liver from control animals. The
er reactions studied, namely the conversion of
lest-5-ene-3β,7α-diol to 7α-hydroxycholest-4-
3-one, the 12α-hydroxylation of 7α-hydroxy-
lest-4-en-3-one, and the 7α-hydroxylation of
rodeoxycholic acid, were influenced much less
biliary drainage. It is suggested that the
roxylation of cholesterol to cholest-5-ene-
7α-diol might be a rate-determining step in
conversion of cholesterol to bile acids.

34 COMPOSITION OF HUMAN HEPATIC BILE. (E.)
van der Linden, W. (U. Umeå, Danderyd,
den) and A. Norman. Acta Chir. Scand. 133(4):
-313, 1967.

ing operations for gallstone disease, bile
bles were taken from the common bile duct in
patients (28 men, 73 women) under standardized
ditions. The conc. of cholesterol, phospho-
ids, bilirubin and total solids were determined.
siderable variations were found in the conc.
the different bile constituents. Comparisons
age and sex revealed no significant differences,
could any relationship be established between
cholesterol conc. in bile and serum. Com-
son of the first bile sample obtained immed-
ely after ligation of the cystic duct with
second and final sample revealed a difference
veen cases with a functioning gallbladder and
se with a nonfunctioning gallbladder; in most
es of the former group, the amount of total
ds was greater in the first sample, while the
osite was true in most cases of the latter
up. Differences between first and second
ple seemed to be larger in the group with a
ctioning gallbladder than in the group without.
ther analysis of the decrease with time in the
up with a functioning gallbladder showed that
of the investigated bile constituents were
olved; significant differences between the
t and second sample were found for total
ds, phospholipids and cholesterol, but the
ference for bilirubin did not approach the
el of significance. The wt. ratio phospho-
ds:cholesterol was highly variable, ranging
0-10.7. The significance of these results for the present concept of the physicochemical mechanism by which cholesterol is kept in soln. is discussed. It is concluded that liver cells which excrete cholesterol into the blood as lipoproteins with a relatively fixed ratio cholesterol:phospholipids, excrete cholesterol and phospholipids into the bile with a considerably less obvious ratio and that bile may hold cholesterol in soln. with very little or no phospholipids.

11085 TWO SITES OF BILE FORMATION AS DETERMINED BY MANNITOL AND ERYTHRITOL CLEARANCE IN THE GUINEA PIG. (E.) Forker, E. L. (U. Iowa, Iowa City). J. Clin. Invest. 46(7):1189-1195, 1967.

Guinea pigs were admin. a single i.v. inj. of 3 μc of erythritol-^{14}C and 15 μc of mannitol-$^{3}H_2$ and to some additional unlabeled mannitol or erythritol to give a final plasma level of 5 mM/liter to study the relationship of biliary clearance to the rate of bile flow and the molecular size of the test solute after admin. of approx. 100 mg of dehydrocholate or 5 U of secretin. Following biliary clearance, the mean increment in bile flow after secretin was only half that seen with dehydrocholate. The av. decline in plasma level expressed as a percentage of the initial value was 7 ± 6% for erythritol and 5 ± 4% for mannitol. The 700-fold increase in plasma level of mannitol or erythritol did not result in reduced clearance of either product. Mannitol had limited access to muscle; it invaded hepatic H_2O almost completely; whereas erythritol approached an equilibrium in both tissues. Spontaneously flowing bile contained 57 ± 4 mEq/liter of bicarbonate which fell to 40 after dehydrocholate and rose to 76 mEq/liter after secretin. The changes in clearance produced by dehydrocholate suggested that osmotic filtration rather than diffusion is the predominant mode of transfer for mannitol and erythritol. The mechanism appeared to effect a net secretion or reabsorption of fluid at a rate roughly proportional to the rate of flow in the canaliculi.

11086 INCORPORATION OF PLASMA FREE FATTY ACIDS INTO BILE LIPIDS IN MAN. (E.) Scherstén, T. (U. Goteborg, Sweden), A. Gottfries, S. Nilsson and B. Samuelsson. Life Sci. 6(16):1775-1780, 1967.

Two male patients, 47 and 58 yr. old, operated upon for cholelithiasis and who had clinically normal liver function, were used to study the incorporation of plasma free fatty acids into human bile lipids. The experiment was performed 6 days after surgery, during which time the enterohepatic circulation was maintained intact. The patient was fasted for 12-15 hr. before the study and was kept afasting during the first 8 hr. of the experiment. Human albumin-complexed palmitate-1-^{14}C was infused into a femoral artery at a constant rate of 0.15-0.18 µc/min. during 1 hr.; samples of blood and bile were collected and analyzed. The turnover rate of plasma free fatty acid C was 12.3 and 14.4 mmoles/min., resp., in the 2 patients. The rise of radioactivity in plasma triglyceride fatty acids and in bile phospholipid fatty acids was parallel and rapid in both subjects. Max. activity was attained in approx. 2 hr. Incorporation of plasma free fatty acids into bile phospholipids occurred almost exclusively into lecithin. In spite of the high content of phospholipid in the liver, a rapid secretion of phospholipids with high specific activity into the bile occurred after infusion of 1-^{14}C-palmitate into the plasma, indicating mixing of radioactivity in the small phospholipid pool in the liver before excretion into the bile. Traces of radioactivity were also found in plasma phospholipids and in bile cholesterol.

11087 THE ACCUMULATION OF TISSUE CHOLESTEROL AND ITS RELATIONSHIP TO BILE ACID AND STEROL TURNOVER. (E.) Beher, W. T. (Edsel B. Ford Inst. Med. Res., Detroit, Mich.), B. Rao, M. E. Beher, G. Semenuk, J. Bertasius and N. Vulpetti. Henry Ford Hosp. Med. J. 15(2):107-118, 1967.

Normal and hypophysectomized rats were divided into equal homogeneous groups to determine the effect of cholestyramine, corn oil and cholesterol on the excretion of fecal bile acids and sterols. Bile-acid-turnover rates, pool sizes and spectrums were studied and compared. Study of the effects of dietary cholesterol and corn oil revealed that cholesterol greatly increased the rate of conversion of liver sterols to bile acids by increasing the rate of elimination of bile acids from their pool. Also, while cholesterol had little effect on the size of the bile acid pool, it increased the proportion of chenodeoxycholic acid. Corn oil had no effect on bile acid metabolism. The increased output of bile acids as influenced by dietary cholesterol constituted a defense mechanism which protected the rat from excess dietary cholesterol. A comparative study of the accumulation of tissue cholesterol of dietary origin in normal and hypophysectomized rats showed that the latter accumulated much more blood and liver cholesterol than normal rats when fed cholesterol-containing diets. Further study showed that the bile acid turnover rate was much slower in hypophysectomized rats than in normals. Bile acid synthesis was much reduced, since these animals had relatively normal bile-acid-pool sizes. The bile acid pool of hypophysectomized rats contained much less chenodeoxycholic acid than the pools of normal rats. A comparative study of cholesterol and coprostanol excretion showed that hypophysectomized rats excreted much smaller quantities of these fecal sterols than normal rats. The hypophysectomized rat was thus relatively unable to handle excess body sterols. Cholestyramine, an insoluble bile acid-binding polymer, was effective in preventing accumulation of tissue cholesterol in normal and hypophysect ized animals, when it was fed along with athero genic diets. This resin greatly increased the turnover rate of bile acids and their synthesis in both types of rats; it had no effect on the size of the bile acid pools.

11088 EFFECT OF PHENOBARBITAL ON THE EXCRET OF AN EXOGENOUS BILIRUBIN LOAD. (E.) Roberts, R. J. (U. Iowa Coll. Med., Iowa City) and G. L. Plaa. Biochem. Pharmacol. 16(5):827-835, 1967.

Treatment of male Swiss-Webster mice with pheno barbital significantly enhanced the disappearan of exogenously admin. bilirubin from the plasma This enhanced disappearance not only occurred i the absence of biliary excretion, but it was ac companied by liver bilirubin conc. exceeding th found in control animals. Both observations su gest enhanced uptake of free bilirubin by the liver as 1 cause of the faster rate of disappea of bilirubin from the plasma. In male Simonsen rats, the max. rate of bilirubin excretion was enhanced by treatment with phenobarbital. Bile vol. was also greater in phenobarbital-treated rats than in control animals. The conc. of bi rubin in the bile was not significantly differe indicating that the increase in bilirubin excre tion was probably due to the increase in bile Indirectly, some of the data suggest that increased bilirubin conjugation may play a role the enhanced uptake and excretion of bilirubin after phenobarbital treatment.

11089 THE DEVELOPMENT OF RADIOACTIVITY IN THE LIVER AFTER THE INJECTION OF RADIOACTIVE ALBUMIN TO DETERMINE HEPATIC CIRCULATORY RATE. (Fr.) Silva Carvalho, J. (Fac Med., Lisbon). C.R. Soc. Biol. (Paris) 161(1) 210-213, 1967.

Of 26 subjects, 4 were normal, 6 had cerebral thromboses, and 16 had diseases with no relati to hepatic circulation; each received i.v. inj of 10-15 µg of ^{131}I-albumin. The radioactivit of the liver and spleen was measured for 1-3 h using a scintillation counter and graphic reco ings. Some sec. after admin. of the ^{131}I-albu radioactivity of the liver increased rapidly a reached a max. value after 10 min. This incre corresponded to the fixation of the radioprote by the Kupffer cells. The av. constant of fix tion was 0.310/min. Following a period of 6-1 min. during which the radioactivity of the liv was at a dynamic max. (gain equal to loss), th radioactivity diminished exponentially in 2 phases, the first about 35 min. and the second with lesser slope, about 105 min. The radioactivity of the spleen was weak thus indicatin a phagocytic activity inferior to that of the liver.

11090 ALBUMIN CONTENT OF RAT HEPATIC CELLS AT DIFFERENT LEVELS OF PROTEIN INTAK

.) Chandrasakharam, N. (U. Malaya, Kuala
mpur), A. Fleck and H. N. Munro. J. Nutr.
(4):497-502, 1967.

study was performed to determine whether the
otein content of the diet affects serum albumin
nthesis by regulating the number of liver cells
tively producing albumin. A fluorescent anti-
rum was prepared against rat albumin and used
r identification of liver cells containing
bumin. Young adult albino male rats were used.
ntrols were fed a stock diet containing 16%
otein. Others were fed either a protein-rich
et, containing 28.5% casein, 41.8% potato starch
d 15% glucose, or a protein-free diet, contain-
g 64% starch and 21% glucose. Both of these
ets also included 5% margarine fat and 10% of a
tamin-mineral-roughage mixture. All diets were
d for 4 days. The number of albumin-containing
lls in the liver was greatest when animals were
d a diet rich in protein; the numbers were inter-
diate when maintained with a stock diet; and
e number was very infrequent when the diet was
void of protein. Deprivation of protein or
eding a protein-rich diet for 4 days had no
gnificant effect on total conc. of protein in
asma, but there was a significant reduction in
asma albumin conc. in the group deprived of
otein. This study confirms that the level of
asma albumin is a more sensitive index than
e level of total plasma protein to deficiency
dietary protein. Protein deficiency decreased
th the plasma albumin level and the total pro-
in conc. in liver to approx. 20% below the level
tained with animals fed the high-protein diet.

091 INVESTIGATION OF HEPATIC DRUG METABOLISM
BY ISOLATED PERFUSED LIVER IN SITU.
.) Benzi, G. (Pavia and Pisa U., Italy), F.
rté and A. Crema. J. Pharm. Sci. 56(7):893-895,
67.

olated and perfused livers in dogs and monkeys,
which blood circulation was maintained by an
tracorporeal pump-oxygenator system, were
aluated with respect to the metabolism of amino-
rine and oxazepam. This study involved the
sessment of demethylation by evaluating the
ansformation of aminopyrine to 4-aminoantipyrine;
etylation by studying the change of 4-amino-
tipyrine to N-acetyl-4-aminoantipyrine and
nally the capacity for glucurono-conjugation by
serving the transformation of oxazepam to
ucuronide. During the perfusion period (2-3
.) no change in SGPT, sorbitol dehydrogenase,
ucine aminopeptidase and BSP time was noted
ile a slight linear increase in SGOT was ob-
rved. The disappearance of both aminopyrine
d oxazepam from the extracorporeal blood was
oid for both dog and monkey. The half-life for
inopyrine was 10-14 min. and 16-20 min. for the
g and monkey, resp., while the half-life for
azepam was 7-10 min. for both animals. De-
thylation activity was very similar in both
e dog and monkey liver. Acetylation was higher
the monkey as compared to the dog. Liver conc.
of 4-aminoantipyrine was similar in both dog and monkey, whereas the liver conc. of N-acetyl-4-aminoantipyrine was higher in the monkey. These findings suggest that this method of isolated liver perfusion may be helpful in assessing liver metabolism in situ.

11092 THE RESPIRATION OF HUMAN LIVER TISSUE. (E.) Booth, J. (Roy. Cancer Hosp., London), E. Boyland and C. Cooling. Biochem. Pharmacol. 16(4):721-724, 1967.

The rate of O_2 uptake (measured in standard Warburg vessels at 37°) was determined in rat (adult Chester Beatty strain) and human liver slices in various media. The incubation media included 1) Krebs-Ringer phosphate; 2) Krebs medium II, type A, which contained pyruvate (4.9 mM), fumarate (5.4 mM) and glutamate (4.9 mM); and 3) Krebs-Ringer phosphate containing succinate (20 mM). All media contained glucose (11.5 mM). The results showed that the O_2 uptake was higher in rat liver than in human liver in all media used and that the difference was greatest when glucose was the only added substrate. Under these conditions the ratio of the mean values for the respiration of rat liver and human liver was 3.9 (9.0/2.3). The O_2 consumption (μliters/mg dry wt./hr.) for man and rat, resp., in each of the 3 incubation media were as follows: 1) Krebs-Ringer phosphate: 2.3 ± 0.3, and 9.0 ± 0.9; 2) Krebs medium II, type A, 6.3 ± 0.7 and 13.8 ± 1.6; and 3) Krebs-Ringer phosphate containing succinate: 24.9 ± 3.9 and 27.7 ± 4.8. It is concluded that the rate of respiration of liver from various species (including man) decreases with increase in body wt., so that the respiratory rate is approx. inversely proportional to the logarithm of the body wt.

11093 EFFECT OF HYPOGLYCEMIC AGENTS ON LIVER REGENERATION. (E.) Gershbein, L. L. (Northwest Inst. Med. Res., Chicago, Ill.). Biochem. Pharmacol. 16(6):1117-1120, 1967.

The effect of therapeutic doses of sulfonylurea and biguanide derivatives (tolbutamide, chlorpropamide, acetohexamide, phenformin·HCl, insulin NPH, glucagon and depropanex) on liver regeneration in partially hepatectomized rats and the long-term effects of prolonged systemic hypoglycemia is reported. Acetohexamide and chlorpropamide depressed liver regeneration at levels of 0.75 and 0.15%, resp. Chlorpropamide at conc. of 0.015% was without effect, but with conc. of 0.40% a marked inhibition of regeneration was observed. Tolbutamide in very large doses did not affect regeneration. The sulfonylureas lost their effect when pancreatectomy was carried out. Phenformin·HCl was a marked inhibitor at both 0.075 and 0.15% conc. Insulin NPH in conc. of 3.3 U/kg daily for 7 days was without effect on regeneration as also was that of glucagon and depropanex. The described inhibitory effects also applied to pair-fed series. It is not certain, according to the authors, whether the observed inhibitory effects by both the sulfonylureas and the biguanides represent a common drug mechanism or whether these drugs act on the regenerating liver at a higher pharmacological level. The possibility that these agents evoke an amino acid antagonism or inhibition of protein synthesis in the regeneration of the liver is suggested for consideration.

11094 STUDIES ON INFLUENCE OF ESTROGEN ON LIPID METABOLISM FOLLOWING PARTIAL RESECTION OF LIVER. (E.) Miyaura, Y. (Kyoto U. Med. Sch. Hosp., Japan). Nippon Geka Hokan (Arch. Jap. Chir.) 36(3):195-223, 1967.

The effect of estrogen (10 μg/100 g inj. i.m. 7 days before partial hepatectomy) on liver regeneration and lipid metabolism after partial resection of the liver was studied in (male Saitama strain) rats, and compared with rats who did not receive the hormone. Increase in body wt. after partial resection of the liver was more rapid in the group that received estrogen, showing restoration of body wt. to the preoperative level to be 5 days after surgery. The rate of increase in liver wt. after partial resection was very rapid in estrogen-treated rats, as compared with non-estrogen-treated animals, and the difference of the rate between these 2 groups was most marked 2-3 days after operation when liver regeneration is at its max. Each fraction of intrahepatic lipids showed a max. level 10 hr. after partial resection, which was followed by restoration to the preoperative level 5 days postoperatively; each lipid fraction was invariably lower in the estrogen-treated group; this was particularly seen in the fractions of intrahepatic total fatty acids, neutral fat and total lipids. The intrahepatic esterified cholesterol:total:cholesterol ratio and the total cholesterol:total phospholipids ratio showed a slight increase temporarily after partial resection; however, there was little significant difference between estrogen-treated and non-estrogen-treated rats. Lipid fractions in the blood (especially total phospholipids and neutral fat) showed a tendency to increase after partial resection, whereas total cholesterol and esterified cholesterol decreased. Free cholesterol, total fatty acids and total lipids showed little fluctuation throughout the pre- and postoperative period. In the group that received estrogen, contents of total phospholipids, total fatty acids, neutral fat and total lipids in the blood were considerably higher than in the non-estrogen-treated group; the reverse prevailed for free cholesterol, esterified cholesterol and total cholesterol. In blood, the esterified cholesterol:total cholesterol ratio and total cholesterol:total phospholipids ratio showed a tendency to decrease after partial resection, and the ratios were invariably lower in estrogen-treated animals. The content of nonesterified fatty acids tended to increase after operation in both groups; the content was smaller in estrogen-treated animals. Histological examination showed no significant difference between the groups. From these results it is c cluded that admin. of estrogen enhances regener tion of the residual liver parenchyma after par tial hepatectomy and inhibits accumulation of f within the liver. Stated differently, the effe of estrogen are to inhibit release of nonesteri fatty acids from the peripheral adipose tissue, to inhibit synthesis of cholesterol within the liver, and to enhance release of neutral fat in the blood stream (which are the results of increased synthesis of phospholipid within the liver).

11095 THE EFFECT OF TESTOSTERONE IN PARTIAL HEPATECTOMIZED FEMALE RATS. (E.) Bengmark, S. (U. Goteborg, Sweden), R. Olsson and B. Rehnstrom. Scand. J. Gastroent. 2(2): 90-94, 1967.

The influence of testosterone treatment on live regeneration after partial hepatectomy was stud in female Sprague-Dawley rats, treated with testosterone-3-(p-hexyloxyphenyl)-propionate (8 admin. i.m.), a long-acting testosterone prepar tion. The rats had been fed a commercial diet of the following composition: crude protein, 23%; carbohydrate, 52%; fat, 4%; ash, 10%; wate 11%; vitamins and salts. The animals were sacrificed 8 days after operation. No influence o the hormone was observed on liver wt. restorati The treatment lowered the liver N conc. before well as after the operation, and the RNA conc. before the operation. It did not influence the postoperative decrease in serum albumin and a α-1-globulin, but caused an increased conc. of α-2-globulin before the operation and of β-2-globulin after the operation. There thus was n evidence of an anabolic effect of the testoster admin. on the liver.

11096 IMPORTANCE OF THE SENSORY NEURONS FOR THE MAINTENANCE OF STRUCTURAL AND FUNCTIONAL INTEGRITY OF THE LIVER. (Rus.) Astakhova, A. M. (2nd Pirogov Med. Inst., Mosco Arkh. Anat. 52(7):104-106, 1967.

Cytological examination of parenchymatous cells of liver with severed afferent nerves showed al signs of a disturbance of secretory process whi occurred early and late in the experiment. During the first mo. after removal of the sensory nodes in the hepatic lobes some cells were overloaded by secretory granules, some contained fe granules, and the cytoplasm of some was complet empty. At a later period after surgical denerva tion all hepatic cells were depleted of secreto granules. Golgi apparatus at different times o denervation showed changes in its location and structure in different parts of the hepatic lobes. In the cells loaded by secretory granul elements of Golgi apparatus had a fine-grained character and were located in the cytoplasm between the secretory granules; in the cells poor with such granules Golgi apparatus had the form of large osmiophilic (argentophilic) rings or

anules. At the later period after afferent
nervation a marked reduction of Golgi apparatus
ements occurred. Mitochondria were also markedly
anged in the deafferentated liver; soon after
rgery they became round and swelled, while
ter 2-4 mo. they became fine-grained and
rkedly decreased in number. This apparently
dicates inhibition of the cellular metabolic
ocesses connected with the mitochondrial func-
ons.

097 DETERMINATION OF SULFOBROMOPHTHALEIN
STORAGE AND EXCRETORY RATE IN SMALL
IMALS. (E.) Klaassen, C. D. (U. Iowa, Iowa
ty) and G. L. Plaa. J. Appl. Physiol. 22(6):
51-1155, 1967.

moval of BSP from plasma by the liver involves
th excretion and storage. A method was devised
simultnaeous determination of relative storage
acity and transport max. in small laboratory
mals, and was compared with Wheeler's method,
ch is presently used in dogs and humans. With
eeler's method, 4 blood samples are taken during
ch infusion period to determine change in plasma
c. for that infusion rate and the corresponding
atic removal rate; when the change in plasma
c. is plotted against hepatic removal rate,
slope of the line is the relative storage
acity and the value of the hepatic removal rate
n change in plasma conc. is zero is the trans-
t max. The new method determined hepatic re-
al against change in plasma conc. differently;
nge in plasma conc. is derived from 4 blood
ples obtained during a 90-min. infusion period,
the transport max. is determined directly by
lysis of BSP in the bile during the same in-
ion period. Comparable values were obtained
dogs by the proposed method when compared to
eler's method, thus substantiating use of the
proposed method in small animals. This is in
eement with what would be expected if the pro-
ed method were validly determining relative
rage capacity and transport max. Using this
posed method, the following transport max.
ues (mg/min./kg) were obtained in anesthetized
mals: dog, 0.17; rabbit, 1.05; and rat, 0.97.
following relative storage capacity values
BSP/mg%/kg body wt.) were simultaneously ob-
ned: dog, 2.4; rabbit, 0.55; and rat, 0.47.

98 IN VITRO DEIODINATION OF ^{131}I ROSE
BENGAL BY RAT LIVER HOMOGENATES UNDER
FERENT METABOLIC CONDITIONS. (Ger.) Voss, C.
Greifswald, Germany), N. Hartmann, B. Wirthgen
H. Bergner. Acta Biol. Med. German. 18(4):
-456, 1967.

ups of white rats were fed 3 separate diets
periods of 8 and 14 days; the first group
a normal diet containing dried milk as a
rce of protein, the second had a protein-free
t and the third received protein in the form
gelatin. Stimulants of metabolism, triiodothy-
ine and dessicated thyroxine and an inhibitor, methylthiouracil were tried in conjunction with the diets to study the in vitro deiodination of ^{131}I-labeled rose bengal. At the end of the feeding period, the livers were excised; following washing and homogenization in buffer, protein was determined in part of the homogenate. Other portions (0.5 ml) of the homogenate were mixed with 30 or 46 µg of radioactive rose bengal (about 6-8 µc) and incubated for 18 hr. at 37°C. After incubation and precipitation of protein the preparation was subjected to paper chromatography. The radioactivity of the fractions was measured by a Geiger-Müller counter and the fractions identified by autoradiography. The homogenate of the normal liver (animals on normal milk diet) had 60% deiodination of rose bengal, the iodine being split off as free I_2. Triiodothyronine, desiccated thyroxine as well as methylthiouracil all repressed the liberation of I_2 from rose bengal. The gelatin diet also reduced the splitting of I_2 from the dye.

11099 HEPATIC SUPPRESSION OF SENSITIZATION TO ANTIGEN ABSORBED INTO THE PORTAL SYSTEM. (E.) Cantor, H. M. (New York U. Sch. Med., N. Y.) and A. E. Dumont. Nature (London) 215(5102):744-745, 1967.

Healthy adult mongrel dogs (20) were divided into 4 equal groups. In Group 1, conc. of antidinitrophenol antibody were measured in blood samples collected from 5 dogs that had no known exposure to 1-chloro-2,4-dinitrobenzene. In Group 2, a soln. of 8 mg of the latter agent in 1 ml of olive oil was inj. s.c. into each of 5 dogs in quantities of 400 µg on the first day, and 200 µg on days 5, 8, 11, and 15; on the twenty-sixth day after the first inj., blood samples were collected and levels of antidinitrophenol antibody were determined. In Group 3 the dinitrophenol dissolved in corn oil (20 mg/ml) was mixed with meat and fed to 5 dogs; on the thirty-fourth day, dinitrophenol was inj. s.c. according to the same schedule followed in Group 2; 26 days after the initial s.c. inj., blood samples were collected and determinations of antibody were made. In Group 4, complete portacaval transposition was done on each of 5 dogs; on the seventieth postoperative day, p.o. feedings of dinitrophenol were begun and thereafter the regimen was identical to that carried out in animals in Group 3. Serum from animals of Group 1 contained no measureable antibody; titers of antibody in Group 2 animals ranged from 1:64 to 1:512. In contrast, sera of 2 of the animals in Group 3 contained no measurable amounts of antibody, in 2 the titers were 1:4, and in 1 the titer was 1:16. Sera of dogs in Group 4 contained antibody in practically identical amounts to sera of dogs in Group 2, ranging from 1:64 to 1:256. These results indicate that repeated p.o. feeding of 1-chloro-2,4-dinitrobenzene to adult dogs before s.c. inj. suppresses the formation of specific circulating antibodies and that diversion of portal flow from the liver abolishes this effect.

11100 CHANGES IN THE ACTIVITY OF ARGINASE IN LIVER, SERUM, AND RINSING FLUID FROM THE PERITONEAL CAVITY AFTER *IN VIVO* AUTOLYSIS OF A LIVER LOBE IN THE RAT. (Ger.) Blech, W. (Martin Luther U., Halle/Saale, Germany). *Z. Ges. Exp. Med.* 144(2):134-144, 1967.

The left liver lobe (about 33% of the total liver) of the rat was ligated at the base and each rat received 5 ml of 0.9% NaCl soln. s.c. Neither peritonitis nor ascites occurred. The ligated lobe was left *in situ*. Arginase activity was determined in the blood serum of experimental and control animals at 6, 12, 24, and 48 hr.; the intact liver and the ligated lobes were removed, separately homogenized, and the enzyme activity of the homogenates measured. In a second series of experimental and control rats, blood was obtained from the tail vein at 6, 12, 18, 24, 36, 48 and 96 hr. Also, 2.0 ml of 0.9% NaCl was inj. i.p. after which the fluid from the peritoneal cavity was drained by means of a cannula and the arginase conc. determined. Enzyme analysis was done by paper chromatography. Arginase activity decreased rapidly during *in vivo* autolysis in the ligated lobe of the rat liver; 48 hr. after ligation the arginase in this lobe was only 40% of that in the intact liver lobes. Arginase activity was present in the peritoneal saline rinse rising to a max. 12 hr. after ligation. Arginase appeared in the serum almost at the same time. In normal animals and after sham operation, no arginase could be detected in the serum or in the peritoneal fluid.

11101 POTASSIUM, SODIUM, AND WATER CONTENT OF LIVER CELLS AND ERYTHROCYTES INCUBATED IN ISOTONIC AND HYPERTONIC SOLUTIONS. (Ger.) Burck, H. C. (U. Tubingen, Germany). *Z. Ges. Exp. Med.* 144(2):93-104, 1967.

RBC and liver slices of the rat were analyzed for K and Na by flame photometry, and the H_2O content determined after incubation in isotonic (0.3 osmoles) and in hypertonic (0.45 osmoles) soln. for 7-360 min. Normal liver cells react like normal human RBC in that Na, K and H_2O content are related in direct regression. Alterations in conc. of ions reflect different degrees of hydration. During incubation cells gain more Na than they lose K resulting in a 50% net gain in total base (Na) caused by a breakdown of the Donnan membrane equilibrium in resp. to this ion. This occurs in both media and then remains constant at this level. The Na:K quotient rises from 0.33 to 3.4 (0.45 osmolar soln.). More K is released from the cell as intracellular Na increases. The cells in the isosmotic medium remain isosmotic and those in the hypertonic medium are hypertonic, although intracellular H_2O has increased in the cells in the hypertonic soln.

11102 EFFECT OF PROGRESSIVE STARVATION ON RAT LIVER ENZYME ACTIVITIES. (E.) Freedland, R. A. (U. California, Davis). *J. Nutr.* 91(4):489-495, 1967.

During progressive starvation in rats, the mos stable enzymes were those associated with gluc ogenesis, glycolysis and the citric acid cycle The activities of enzymes thought to be indire involved in lipogenesis were the least stable. The following was observed in young rats: tot liver protein, liver glycogen phosphoglucomuta fructose diphosphatase, aldolase, succinic dehydrogenase and fumarase decreased in activity after 1 day of starvation, then remained const the next 3 days. On days 1 and 4 of starvatio a decrease was noted with soluble liver protei phosphohexoseisomerase, glyceraldehyde-3-phosp dehydrogenase, LDH, α-glycerophosphate dehydro enase, malic enzyme, isocitric dehydrogenase a malic dehydrogenase. A decrease in the activi of phosphorylase, glucose-6-phosphate dehydrog 6-phosphogluconate dehydrogenase and the pento phosphate-metabolizing enzymes was observed on days 1, 2 and 4. Glucose-6-phosphate and ur diphosphate glucose dehydrogenase activities r mained constant until a decrease on day 4. Ge erally, the trends were similar with older rat with the following exceptions: a sharp decrea on day 1 in the uridine diphosphate glucose de hydrogenase, a greater decrease in glucose-6-phosphatase and lactate dehydrogenase activity and a greater resistance to decreased activity aldolase, α-glycerophosphate dehydrogenase, is citric dehydrogenase and glucose-6-phosphate d hydrogenase.

11103 CIRCADIAN RHYTHMS OF LIVER ENZYMES A THEIR RELATIONSHIP TO ENZYME INDUCTI (E.) Civen, M. (VA Hosp., Long Beach, Calif.) R. Ulrich, B. M. Trimmer and C. B. Brown. *Sci* 157(3796):1563-1564, 1967.

Male Sprague-Dawley rats were used to assess circadian changes in 2 liver enzymes, tyrosine α-ketoglutarate transaminase and phenyl-alanir pyruvate transaminase; the former is known to inducible by glucocorticoids and glucagon, whi activity of the latter enzyme changes only sli after repeated inj. of glucocorticoids. Tyros α-ketoglutarate transaminase showed circadian rhythmicity in the intact rat; it underwent a change, with minimum activity at 11 a.m. and m activity at 9 p.m.; plasma corticosterone rose from its minimum level at 6 a.m., to its max. 6 p.m., with an increase of 1870%; the peak activity occurred 3 hr. after the max. corticosterone level. This rhythmicity was only slightly altered after adrenalectomy, indicati that adrenal hormones do not play a major role in the metabolic control of the activity of ty rosine α-ketoglutarate transaminase. On the other hand, phenylalaninepyruvate transaminase which is not inducible over the same period, c not show circadian variation. These results s gest that the sensitivity of an enzyme's regul ing system to inducing agents may be related t the inherent circadian rhythm of the enzyme.

11104 THE EFFECT OF SOME APORPHINE ALKALOI ON BILE SECRETION IN RATS. (Pol.)

kowski, B. (Inst. Pharm., Warsaw), A.
perak-Neciażek, K. Obojska and Z. Szmal. Diss.
rm. (Krakow) 18(5):455-465, 1966.

otal of 141 Wistar rats (160-250 g) were
ided into 6 groups and the effect of glaucine,
corydine, magnofluorine and boldine on secre-
n of bile, its dry residue, and chromatographic
tern was studied. Bile was collected through
atheter inserted into the bile duct 0.8-1.0 cm
n its duodenal opening and connected to a
ibrated pipette. Determinations were made at
r. intervals. The first hr. was used as a
trol after which the compounds were inj. into
duodenum in a vol. of 1 ml/100 g body wt.
up 1 (11 rats) served as control, Group 2 (10)
eived 200 mg/kg of dehydrocholic acid and
ved as standard, Group 3 (35) was given 200,
nd 20 mg/kg doses of glaucine hydrochloride
the duodenum and 5 mg/kg i.v. Group 4 (35)
eived 200, 50 and 5 mg/kg of isocoridine,
up 5 (20) 50 and 5 mg/kg of magnofluorine per-
rate and Group 6 (30) 20 and 5 mg/kg of
line. Glaucine in 50 mg/kg dose and isocoridine
0 and 5 mg/kg dose increased bile secretion
were both toxic in the 200 mg/kg dose causing
h of 40-50% of animals after 2-3 hr. Magno-
rine had no effect on vol. or quality of
eted bile. Boldine in 20 mg/kg dose caused
all decrease of bile vol. after 2 and 3 hr.
matographic analysis showed a decrease of
acids after glaucine and isocoridine which,
a simultaneous decrease of dry bile residue
increased vol. of secreted bile points to a
eretic action of these compounds. Boldine
eased the amount of dry residue and chromatog-
y showed an increase of bile acids and phos-
ipids with this compound indicating that it
ulates bile synthesis.

5 FUNCTION OF THE LIVER CELLS IN THE SHORT-TERM AND THE LONG-TERM CULTURES. I.
MIN PRODUCTION OF THE LIVER CELLS IN VITRO.
Namba, M. (Okayama U. Med. Sch., Japan).
Med. Okayama 20(6):251-259, 1966.

min production of cultured liver cells (5
erent cell strains) was studied by immunolog-
methods, especially immunofluorescence and
complement fixation test. Albumin production
detected in the strain RLN-10 liver cells
blished from the liver tissues of a Donryu
this confirmed that the cultured liver cells
tained the function of producing albumin, and
e cells originated from parenchymal liver
s. Two hepatoma strains also showed produc-
of albumin, but the extent of its production
less than that of strain RLN-10; this in-
ted that hepatoma cells maintain some functions
ormal liver cells. In short-term culture,
r cells did not show albumin production after
., but after 3 mo. slight albumin production
demonstrable. It is thought that cultured
r cells adapt themselves to the new culture
itions and gradually begin to display some
he functions of the liver cell. A certain time period may be necessary before cultured cells adapt to the in vitro environment. The proliferation rate of strain RLN-10 liver cells was approx. 3-5 fold in 7 days, using a medium consisting of 20% bovine serum, 0.4% lactalbumin hydrolyzate and buffered saline; the chromosome distribution was near the triploidy region, but the relationship between the albumin production and the chromosome number could not be ascertained.

11106 THE FINE STRUCTURE OF RAT LIVER CELLS IN SUSPENSION. (E.) Carr, K. E. (U. Glasgow, Scotland), J. P. Arbuthnott, P. G. Toner and C. G. Gemmell. Z. Zellforsch. 79(2): 265-271, 1967.

The method of Jacob and Bhargava was evaluated for its merit in obtaining high yields of parenchymal cells from perfused rat liver by comparison with a modification characterized by the use of less mechanical pressure. Material for fine structure study by electron microscopy was embedded in epoxy resin in an attempt to avoid the polymerization damage which can occur with methacrylate embedding. Both methods gave recognizable hepatic parenchymal cells under the light microscope although certain cell debris, including nuclei, was seen. The fine structure of perfused liver slices appeared to be relatively normal. Neither the mitochrondria nor granular endoplasmic reticulum was distorted in the majority of instances and cell membranes were intact. In contrast, the fine structure of hepatic cell suspensions prepared by the method of Jacob and Bhargava or by its modification was markedly distorted. Discontinuities of the cell membrane were present in all samples, the faults ranging from small gaps to extensive ruptures. The membrane itself appeared thinner and less regular than in tissue slices and the type of damage observed in the cell membranes could possibly be a cause of increased permeability. The limitations of cell suspensions as models of biochemical function are discussed.

11107 ENZYMES OF FRUCTOSE METABOLISM ACTIVITY AND DISTRIBUTION IN THE RAT LIVER. (Ger.) Heinz, F. (Munich Techn. Inst., Germany) and W. Lamprecht. Hoppe Seyler Z. Physiol. Chem. 348(7):855-863, 1967.

In the rat liver homogenized in the cold and centrifuged for 20 min. at 30,000 revolutions/min. at 5°C, the clear supernatant was used for the determination of cellular enzymes involved in fructose metabolism. Mitochondria, microsomes and nuclei were separated by differential centrifugation and the enzyme content of each entity was established with resp. to fructose metabolism. New and simple methods for determination of triokinase and aldehyde dehydrogenase are described. Ketohexokinase, ketose-1-phosphate aldolase, triokinase and hexose diphosphatase were found only in the cytoplasm. Aldehyde dehydrogenase, D-glycerate kinase and the sorbitol dehydrogenases were present in both the cytoplasm and mitochondria. A physiological reduction of

D-glyceraldehyde to glycerol followed by phosphorylation to L-glycerol-3-phosphate seems improbable from kinetic measurements. Alcohol dehydrogenase and glycerol kinase were confined to the cytoplasm. D-glyceraldehyde may be metabolized in or on the surface of the mitochondria. A comparison of the activities of hexokinase and ketohexokinase show that, under optimal conditions, more fructose than glucose can be metabolized in the liver.

11108 PROTEIN SYNTHESIS IN VIVO IN THE PANCREAS AND LIVER OF THE RAT UNDER NORMAL CONDITIONS AND DURING LEUCINE AND THREONINE DEFICIENCY AND DURING RECOVERY FROM THE DEFICIENCY. (Fr.) Vandermeers, A. (Free U. Brussels), M. C. Vandermeers-Piret and J. Christophe. Bull. Soc. Chim. Biol. (Paris) 49(7):759-778, 1967.

Male white rats were divided into 3 groups; the first group received a complete diet; the second a diet based on gluten and deficient in lysine and threonine; the animals were sacrificed after 23 days. The third group received a deficient diet for 20 days then casein-DL-methionine for 3 days before sacrifice. The animals each received i.p. 3.5 μc of ^{14}C L-leucine and were killed 5, 10, 20, 30 and 60 min. later; blood from each group of animals was pooled, centrifuged, and the radioactivity of the plasma leucine and other radioactive compounds (proteins) determined. Pancreatic and liver tissues were homogenized and radioactive compounds analyzed by radiochromatography. The labeling of pancreatic and liver proteins was compared to the specific radioactivity of free leucine in the tissues and in the plasma. Av. rate constants for protein biosynthesis and protein turnover were calculated from the data collected before degradation and/or exportation of newly-synthesized proteins. In 200 g control rats, the turnover time of pancreatic proteins was 34 hr.; a smaller value (24 hr.) was calculated for liver proteins; this value was apparently shortened by a dilution factor, mainly of dietary origin. Rats of identical age but of only 100 g wt. after 3 wk. of lysine and threonine deficiency synthesized 101% more pancreatic proteins and 41% more liver proteins on a tissue wet wt. basis. The low protein content of these tissues indicated an accelerated transfer and/or degradation rather than an inadequate synthesis. Rats having recovered from amino and deficiency during a period of 3 days increased pancreatic protein synthesis still further and the turnover time was reduced to 8 hr. The liver seemed less active, but the heterogeneity of the free leucine pool was a complicating factor.

11109 HISTOCHEMISTRY OF THE LIVER. BIOCHEMICAL AND ELECTRON MICROSCOPE COMPARISONS. PART 2. (Fr.)(Rev.) Corcos, V. (St. Antoine Hosp., Paris), A. Lageron, R. Wegmann and J. Caroli. Rev. Int. Hepat. 17(4):267-365, 1967.

11110 INVESTIGATION OF GLYCOPROTEIN MATERIA ASSOCIATED WITH HEPATIC AMYLOID. (E. Nichols, R. B. (U. Bristol, England) and J. R. Clamp. Clin. Chim. Acta 17(3):415-421, 1967.

11111 CA^{++}-DEPENDENT MOVEMENTS OF H^{+} AND K^{+} ACROSS THE RAT LIVER MITOCHONDRIAL MEMBRANE. (E.) Carafoli, E. (U. Modena, Italy and C. S. Rossi. Europ. J. Biochem. 2(2):224-228, 1967.

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11115 IMMUNOCHEMICAL CHARACTERIZATION OF SUBCELLULAR FRACTIONS FROM ISOLATED PARENCHYMAL AND RETICULOENDOTHELIAL RAT LIVER CELLS. (E.) Lundkvist, U. (U. Stockholm), P. Perlmann and U. Enekull. Exp. Cell Res. 47(1-2 363-376, 1967.

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11131 ENZYME MATURATION. ACTIVITY OF GLUCOSE-6-PHOSPHATE DEHYDROGENASE IN THE LIVER OF PREMATURE BABIES. (It.) Cordone, G. (U. Genoa, Italy) and G. Gemme. *Minerva Pediat.* 19(28):1329-1331, 1967.

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11137 METABOLISM OF BILE PIGMENTS: GLUCURONIC CONJUGATION. (It.)(Rev.) Pasini, P. (G. Ceccarini Hosp., Riccione, Italy). *G. Clin. Med.* 48(6):656-666, 1967.

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11141 COMBINED ACTION OF ACETYLCHOLINE, HYDROCORTISONE, INSULIN, SOMATOTROPHIN, ADRENALINE AND NORADRENALINE ON THE TEMPERATURE OF LIVER AND MUSCLE. (Pol.) Molenda, R. (Sadowej Med. Inst., Bialystok, Poland) and A. Obrzut. Endokr. Pol. 18(4):427-435, 1967.

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11148 THE METABOLISM OF CORYNANTHEIDINE AND 9-METHOXYCORYNANTHEIDINE-TYPE ALKALOI BY LIVER MICROSOMES. (E.) Beckett, A. H. (U.) London) and D. M. Morton. Biochem. Pharmacol. 16(8):1609-1615, 1967.

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11151 EFFECT OF OLEIC ACID ON THE OXIDATION AND GLUCONEOGENESIS FROM [I-^{14}C] PYRUVATE IN THE PERFUSED RAT LIVER. (E.) Teuf H. (City Hosp., Munich, Germany), L. A. Menahan J. C. Shipp, S. Böning and O. Wieland. Europ. J. Biochem. 2(2):182-186, 1967.

11152 EFFECT OF OVINE GROWTH HORMONE ON TH VARIATIONS OF GLUCOSE AND FREE FATTY ACIDS IN THE PERFUSION SYSTEM OF RAT ISOLATED LIVER. (E.) Costiner, E. (Inst. Endocrin., Bucharest), L. Vaisler, E. Dinulescu and C. Gheorghiu. Rev. Roum. Endocr. 4(3):217-219, 1

11153 GLYCEMIA AND FREE FATTY ACID VARIATI UNDER THE ACTION OF CORTICOTROPIN. STUDIES CARRIED OUT BY THE PERFUSION TECHNIQUE OF IN VITRO ISOLATED RAT LIVER. (E.) Vaisler L. (Inst. Endocrin., Bucharest), E. Costiner, E. Dinulescu and C. Gheorghiu. Rev. Roum. End 4(3):209-215, 1967.

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56 THE DETERMINATION OF MAXIMUM BILIRUBIN
BINDING CAPACITY OF HUMAN ALBUMIN AND
UM BY A CALCIUM CARBONATE ADSORPTION TECHNIQUE.
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., Washington, D. C.). Clin. Chim. Acta
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ethod was devised to study the feasibility of
arating unbound bilirubin from albumin-bound
irubin by bath calcium carbonate adsorption,
ed upon previous observations that suspensions
calcium carbonate completely adsorbed unbound
irubin from soln. but had little adsorptive
action for albumin and other serum proteins.
procedure was used to study bilirubin binding
uman albumin and serum as well as effects of
ral serum and plasma fractions on the binding
acity of human albumin. Serum gave variable
consistently higher bilirubin albumin molecular
ding ratios than did purified albumin when
ed in dilute soln. In more conc. soln., serum
ding capacity decreased dramatically. Results
ined in studies testing serum and plasma
ein fractions for their effect of bilirubin
ding by albumin suggested that an interaction
lbumin with a high-density lipoprotein
uenced binding capacity. This study demon-
ted that calcium carbonate selectively adsorbs
und bilirubin from bilirubin-albumin soln.

7 AN IMPROVED PERFUSION TECHNIC FOR
RECOVERING ADULT SCHISTOSOMES FROM
RATORY ANIMALS. (E.) Duvall, R. H. (NIH,
esda, Md.) and W. B. DeWitt. Amer. J. Trop.
16(4):483-486, 1967.

chnic for recovering adult schistosomes from
rimentally-infected animals is described,
ng use of an automatic pipetting machine
h serves as a perfusion pump. The method
ists in admin. i.p. a combined inj. of pento-
ital sodium and heparin to produce a shift of
worms from the mesenteric veins to the liver,
to prevent clotting while they are perfused
ctly into conical sedimentation glasses for
ection and counting. Complete shifting of
worms greatly facilitates their recovery, and
overdose of anesthetic causes death of the
al within 3-5 min. The method described
ies to recovery of womrs from mice, but can
dapted with minor changes for use on other
ratory animals. Better than 98% efficiency
ecovery of worms is obtained. The method is
ly efficient in recovering very small worms
in detecting unpaired females. The data also
cate that the perfusion technic is as efficient
recovery of worms from mice with chronic
ctions as it is from mice recently infected.
typical experiment involving 50 mice infected
3 wk., a total of 1224 worms were recovered,
. of 24.5/mouse. Only 4 additional worms
recovered from the perfused mice by meticulous
ination of the liver, lungs and intestinal
vessels. It is emphasized that the method
apid and simple.

11158 ARTIFACTUAL LOWERING OF THE TOTAL BILIRUBIN VALUE. (E.) Baer, D. M. (Providence Hosp., Portland, Ore.) and D. C. Wood. Clin. Chim. Acta 17(1):1-3, 1967.

Occasionally, jaundiced patients are encountered in whom the total bilirubin is apparently less than the direct reacting fraction. Apparently, dyphylline and (presumably) caffeine react with the bilirubin to inhibit the diazo reaction. Although the reaction is prevented to some degree by the 3-fold dilution of serum and diazo in the total procedure as compared to the direct procedure, this inhibition is insignificant when compared to that produced by dyphylline. Increasing the quantity of diazo reagent causes elevations of the direct-reacting fractions, but not the total. Using serum from a patient with nutritional cirrhosis, a modification of the Michaelsson-Jendrassik-Grof procedure was devised to eliminate this artifact; dyphylline inhibition was overcome by allowing the diazo to react for 2 min. before addition of dyphylline in the total bilirubin reaction procedure.

11159 POSTERIOR PITUITARY EXTRACT IN THE TREATMENT OF DIGESTIVE HEMORRHAGE. (Fr.) Bories-Azeau, A. (St. Eloi Hosp., Montpellier, France), R. Colin and J. Dossa. Arch. Mal. Appar. Dig. 56(5):429-434, 1967.

Posterior pituitary extract (30-40 U in 200-250 ml of isotonic saline) was i.v. infused over a 20-min. period after blood transfusion restoring blood vol. in 28 cases of hemorrhage. Of these 28 cases, 16 resulted from portal hypertension, 5 from ulcers, 4 from aspirin or cortisone, and 3 from unknown causes; all required immediate treatment. Hemostasis was obtained during the first hemorrhage with the first inj. of the extract in 22 of 29 cases (75%); of these 22 patients, 17 recovered without further hemorrhage, 11 received medical treatment with only 2 deaths, and 6 underwent surgery with 1 fatality. Among 5 patients with relapses, 1 recovered and 4 died. Infusion of posterior pituitary extract had no effect on the primary hemorrhage in 6 subjects, 2 dying after emergency portacaval anastomoses, 2 dying with inoperable portal hypertension, and 2 recovering after intervention for gastric ulcer. Posterior pituitary extract reduced the portal pressure and liver blood flow.

FACTORS INFLUENCING THE TEARING STRENGTH OF GASTROTOMIES AND ENTEROTOMIES. EXPERIMENTAL INVESTIGATIONS WITH REFERENCE TO DEHISCENCE OF SUTURES IN CANCER SURGERY. (Ger.) Priesching, A. (U. Clin. Vienna). Klin. Med. (Wien) 22(5):201-232, 1967 and 22(6):241-260, 1967.

Mechanical factors such as the placement of surgical clamps during operation and the optimal distance between sutures were investigated. The effect of ligation of blood vessels, such as is necessary for interposition of intestinal segments, upon total blood flow and anastomosis strength was measured. The intestinal application of Periston-N (polyvinylpyrrolidone) or a soln. of electrolytes increased the tearing strength of intestinal segments with ligated blood vessels. Trenimon (triethyleneiminobenzoquinone) reduced the mechanical strength of anastomoses not only in a general dose-related manner but also in relation to other factors, e.g., the extent of the incision; wound healing was affected by doses which were not injurious to the animal as a whole (as body wt.). Cyclophosphamide affected general conditions of the animals but not wound healing. An uncorrected acute hyporolemia reduced resistance of the anastomoses. Other factors which underwent extensive investigation were: extent of operation (splenectomy, pancreatosplenectomy, liver resection) in correlation to wt. of the adrenal glands, the neutral effect of Trasylol following pancreatectomy, lack of value of adhesions as an indication of wound healing, summation of multiple factors occurring during wound healing. The effect of these factors and others were measured in large groups of animals and statistically evaluated.

11161 EFFECT OF EPINEPHRINE ON CELIAC AND SUPERIOR MESENTERIC ANGIOGRAPHY. (E.) Boijsen, E. (Univ. Hosp., Lund, Sweden) and H. Redman. Invest. Radiol. 2(3):184-199, 1967.

The inj. of small doses of epinephrine into the celiac and superior mesenteric arteries prior to angiography has shown promise in improving detection of lesions of upper abdominal organs. On 65 unselected patients, the practicability of epinephrine in the diagnosis of various lesions of 2 vascular beds and the physiologic changes involved was studied. The usual angiographic procedures were performed, using 1 or 2 catheters, and evaluation was made of changes in arterial detail, transit time of contrast material, capillary accumulation, venous opacification and diagnostic efficacy. A marked difference was seen in the effect of epinephrine on the various splanchnic arteries. An actual decrease in transit time of the contrast material was seen in bowel arteries. Pancreatic vessels were not constricted except in the presence of chronic pancreatitis while duodenal arteries showed increased filling following drug admin., capillary accumulation was generally reduced except in the duodenum. Veins were not seen as well except in the superior mesenteric distribution. Primary and secondary tumors were better seen after epinephrine if they were vascular and if the contrast material reached the vascular bed of the tumor. Carcinomas of the stomach were not detected as well because of marked constriction of the gastric vessels. Inflammatory lesions showed increased constriction after the drug; duodenal lesions were an exception. The drug did not affect collateral vessels. Complications from epinephrine admin. were not evident in this study but toxic effects should be kept in mind. This technic is suggested for physiologic investigations.

11162 THERAPY OF PERITONITIS AND WOUND INFECTION. (E.) Prohaska, J. V. (U. Chicago, Ill.) and R. Kramar. Pacif. Med. Surg 75(4):251-257, 1967.

In 25 patients with toxic megacolon, 10 had perforation and peritonitis, and 15 had neithe of these complications. Of those with toxic megacolon and peritonitis, 4 were treated with peritoneal lavage with normal saline soln. (co taining 1 g of oxytetracycline) followed by continuous i.v. infusion of 1 g oxytetracyclin hr. for 3 days. There was 1 death, giving a 25% mortality rate. Among the 6 patients with toxic megacolon and peritonitis not treated wi oxytetracycline, there were 5 deaths, giving a mortality rate of 83%. Another group of 15 patients suffering with ulcerative colitis or regional enterocolitis developed peritonitis f various sources; this group suffered generaliz peritonitis complicating the inflammatory dise of the large or small intestine. Together wit those with toxic megacolon and peritonitis, th made a total group of 25 with peritonitis. Th were 10 (40%) not treated with oxytetracycline with 5 deaths (50%), but among 15 (60%) treate with oxytetracycline, there were only 2 deaths (13%), giving a survival rate of 87%. In a to group of 73 patients with ulcerative colitis, ileocolitis or regional enteritis, whose cours was complicated by toxic megacolon, with or without colon perforation or by enterocutaneou fistulae, the incidence of wound infection was 20%, being 32% in the untreated group and 6% i the group that received oxytetracycline therap It is concluded that oxytetracycline-saline wa of the contaminated peritoneal cavity signific reduces the mortality rate from peritonitis an sepsis.

11163 A NEGLECTED ROENTGEN DIAGNOSTIC FEAT OF RUPTURED ANEURYSMS OF THE ABDOMIN AORTA. (E.) Nevin, I. N. (St. Mary's Hosp., Rhinelander, Wis.). J. Lancet 87(7):259-261, 1967.

Review of anteroposterior films of the abdomen of 5 consecutive, verified cases of ruptured aneurysms of the abdominal aorta revealed a triangular-shaped soft-tissue density along th left side of the pelvic cavity. The medial border of this density ran diagonally from ab the inferior border of the sacroiliac joint to the ischial spine along the expected position the pelvic portion of the psoas muscle. The lateral border of the soft-tissue density con formed to the inner aspect of the iliac bone sometimes overlapped the bone itself. This density was slightly above the expected locat of the obturator internus muscle. The soft-tissue density is thought to represent the

nward extension of a retroperitoneal hematoma
m the ruptured aneurysm along the pelvic
tion of the psoas muscle. When there is
nical or radiological evidence of an aneurysm,
presence of this soft-tissue density may
rt the clinician to the probability of a
ture; this may be of more significance than
obliteration of the psoas muscle, which has
n known to occur in some abdominal aneurysms
hout rupture.

64 THE ROLE OF SPECIFIC BACTERIOPHAGE IN
THE CONTROL OF THE CARRIER STATE OF
GELLA FLEXNERI 6 BACILLI. (Pol.) Mulczyk, M.
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7.

outbreak of dysentery caused by *Shigella*
xneri 6 in a children's home involving 14
ldren and 4 adults was treated with sulfonamides
antibiotics; symptoms disappeared, but the
ated patients remained carriers. Sporadic
ppearance of symptoms resisted therapy with
h doses of sulfguanidine, Chlortetracycline
tetracycline and chloramphenicol. Isolated
gella organisms were tested for sensitivity
12 strains of bacteriophages which are usually
d for typing of *S. flexneri* strains and were
nd to be sensitive to phage F 10. This phage
then grown on cultures of *S. flexneri* 6
ntained in broth and phage lysates of a 10^{10}
er were thus obtained. The bacteriophage was
en p.o. to carriers in a 2% soln. of bicarbonate
soda (5 ml to children, 15 ml to adults) 3
es daily, 1 hr. before meals, for 4 days. The
ol was examined 3 times in 3-4-day intervals
the presence of *Shigella* and treatment and
ol examinations were repeated twice at 2-wk.
ervals. In only 1 of the 18 patients was
flexneri, which was resistant to phage 10,
lated. Follow-up examinations of stools during
next 7 mo. remained negative. A yr. later a
outbreak of dysentery involving 34 newly-
itted children was treated in the same manner
excellent results. After the second admin.
the phage there were no carriers and stools
ained negative on repeated follow-up examina-
ns. The isolated *S. flexneri* strain contained
Resistance Transfer Factor. It is concluded
t since the resistance transfer factor is
ountered more and more frequently in strains
Shigella and *Salmonella*, chemotherapy will
ome more difficult. The use of specific
teriophages in the treatment of intestinal
ections and carrier states should be seriously
sidered.

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11213 DIRECTIONS FOR THE ENDOSCOPIC AND BIOPSY STUDIES OF THE ESOPHAGUS, STOMACH, LIVER, KIDNEYS. (Ger.) Kuhlmann, H. Stuttgart, Schattauer, 1966, 75pp., $4.25.

See also abstract nos.: 11106,11322,11399

GASTROINTESTINAL DISEASES

GENERAL

11214 SOME PHYSIOLOGICAL, BIOCHEMICAL, AND MORPHOLOGIC EFFECTS OF TRIS (p-AMINOPHENYL) CARBONIUM SALTS (TAC) ON *Schistosoma mansoni*. (E.) Bueding, E. (Johns Hopkins U., Baltimore, Md.), E. L. Schiller and J. G. Bourgeois. *Amer. J. Trop. Med.* 16(4):500-515, 1967.

Subcurative doses of the antischistosomal drug tris (p-aminophenyl) carbonium chloride were given to adult white or C3H mice infected with cercariae of *Schistosoma mansoni*. This agent produced 3 distinct changes in the parasite. A reduction of glycogen occurred in the cuticular tubercles of the males; this was followed by a flattening and subsequent disappearance of these structures. Alterations in the morphologic and functional properties of the female reproductive system occurred; it was detectable by an *intra vitam* staining method and led to abnormal egg formation. In contrast to these 2 changes, the effects on the female reproductive system were not specific for tris (p-aminophenyl) carbonium chloride, but were also observed after admin. of subcurative doses of other antischistosomal drugs. At a later stage, inhibition of acetylcholinesterase activity in the nervous system of the worm was produced, resulting in a paralysis of the adhesive organs. This coincided with the separation of the sexual pairs and a shift of the worms from the mesenteric vessels toward the liver. The drug-induced paralysis of the adhesive organs was reversed immediately on exposure of the worms to cholinergic-blocking agents *in vitro*.

11215 FAMILIAL POLYPOSIS ASSOCIATED WITH A NEW TYPE OF SOFT-TISSUE LESION (SKIN PIGMENTATION): REPORT OF THREE CASES AND A REVIEW OF THE LITERATURE. (E.) Weston, S. D. (Caledonian Hosp., Brooklyn, N. Y.) and M. Wiener. *Dis. Colon Rectum* 10(4):311-321, 1967.

Three brothers are described as all having the typical symptoms of Gardner's syndrome with the added feature of skin pigmentation limited to the torso. The first (age 24 yr.) presented with a history of irregular bowel action and occasional rectal bleeding. Examination showed that the entire rectal segment was involved with sessile and pedunculated polyps. Numerous sebaceous cysts were scattered over the body and pigmented spots were noted on the lower back. The accessible polyps were removed rectally and the remaining ones were fulgurated. Afterwards, a subtotal colectomy with ileoproctostomy was performed. The 16-yr.-old brother who was without complaints had marked rectal polyposis. Pigmentation was seen over the anterior and posterior chest and abdomen; Mandibular endosteal osteoma was also present. This patient was successfully treated in the same manner as the first. Examination of a third brother (age 17) who had a history of diarrhea, abdominal cramps and bloody stools also revealed sebaceous cysts, numerous pigmented spots on the chest, abdomen and back, osteomas of the parietal bone and discrete polyps of the rectum and rectosigmoid. Treatment was the same as th others. Examination of a sister was negative. The mother refused examination but the father had died of cancer of the rectum associated wit multiple polyposis. Four cousins were reported as having multiple polyposis and several uncles supposedly died of cancer of the bowels.

11216 UMBILICAL AND VENTRAL HERNIORRHAPHY: A REVIEW OF 1000 CASES. PART I. CHARACTERISTICS WHICH PREDICT SURGICAL RESULTS AND PREDISPOSING FACTORS. (E.) Musca, A. A. (Cleveland Metropol. Gen. Hosp., Ohio). *Int. Surg.* 48(2):169-179, 1967.

Of 1008 patients who underwent a total of 1108 umbilical and ventral herniorrhaphies, 75% were operated upon in an indigent clinic, whereas th rest were treated in a private clinic. Incisio hernias were most common (56%) and were general found in the lower abdomen and usually represen secondary complications of prior surgery. More patients with incisional hernia were treated at the private clinic, whereas more patients with umbilical hernia were treated at the indigent clinic; more umbilical hernias were observed in female patients. Both hernia types had a highe incidence in female patients who were Caucasian and who were also obese. There was associated lung disease in 8.9% of the patients and urinar or gastrointestinal disease in 3.4%. Disorders of the supporting tissues occurred in over 50% of the evaluated patients and included hemorrho (17.2%), varicose veins (14.1%), other hernias (11.4%), cystocele and rectocele (13.2%) and diverticulosis (6.5%). Emergency procedures we conducted with greater frequency at the indigen clinic as compared with the private clinic (23.0% to 8.1%). There was no correlation betw the duration of symptoms and intestinal viabili however, the mortality rate was correlated with intestinal viability (22.2% rate for gangrenous intestines and 10.5% rate for incarcerated, but unstrangulated intestines). The mortality rate was also in direct proportion in those patients who were older and also in those with associate systemic disease. Patients with Laennec's cirr sis showed a death rate of 20%. In patients of more than 200 pounds, the incidence of lung emb was 5% and the incidence of thrombophlebitis wa 10%.

11217 IMPAIRED LYMPHOCYTE TRANSFORMATION AN DELAYED HYPERSENSITIVITY IN SJÖGREN'S SYNDROME. (E.) Leventhal, B. G. (NCI, Bethesd Md.), D. S. Waldorf and N. Talal. *J. Clin. Inv* 46(8):1338-1345, 1967.

In vitro lymphocyte transformation in response phytohemagglutinin and streptolysin 0 and *in vi* skin sensitization to 2,4-dinitrochlorobenzene

s studied in 33 patients (2 men, 31 women; 30-
yr. old, with a mean of 55 yr.) with Sjögren's
ndrome (who had symptoms for 1-21 yr.), in 17
tients with classical rheumatoid arthritis (4
n, 13 women; 2-60 yr. old) and in 20 normal
ntrols (2 men, 18 women; 25-68 yr. old). Of
ose with Sjögren's syndrome, 13 had the sicca
ndrome alone, 12 had the sicca syndrome and
eumatoid arthritis, 1 had sicca syndrome with
mphoma and 7 had the sicca syndrome with
eudolymphoma. 2,4-Dinitrochlorobenzene was
lied as 2000 μg in 0.1 ml acetone to an area
the upper arm skin. Both the in vivo and
vitro responses were significantly impaired
the Sjögren patients as compared to controls.
s lack of mitogenic agents is probably due to
intrinsic defect in the lymphocytes rather than
a serum factor. Abnormalities were less marked
those patients whose disease was localized to
parotid and lacrimal glands than in those
h generalized disease, i.e., with complicating
udolymphoma or rheumatoid arthritis. Delayed
ersensitivity was found in 16 of 17 normals,
of 15 (67%) with rheumatoid arthritis and 8 of
with Sjögren's syndrome; the latter included
f 9 with sicca syndrome alone (55%), 1 of 9
%) with sicca syndrome and rheumatoid arthritis
2 of 5 (40%) with sicca syndrome and pseudo-
phoma.

18 EXPERIMENTAL CHOLERA IN THE RABBIT
INTESTINAL LOOP: FLUID ACCUMULATION
SODIUM PUMP INHIBITION. (E.) Leitch, G. J.
Chicago, Ill.), W. Burrows and L. C. Stolle.
Infect. Dis. 117(3):197-202, 1967.

lyzable and nondialyzable fractions Vibrio
lerae 569B whole cell lysate were inj. into
duodenal and lower ileal loops of adult rabbits.
both the duodenum and ileum, the material
able of eliciting an accumulation of fluid in
lumen was nondialyzable. When the loop
nsmural potential difference was measured by
lanting electrodes in the rabbits, it was
erved that the dialyzate was capable of reduc-
the potential across the lower ileum, but
hout overt evidence of fluid accumulation, and
the duodenum neither fluid accumulation nor a
uction in potential difference were produced.
vitro measurement of the short-circuit current,
nsmural potential difference and tissue re-
tance of toxin-treated loops indicated that
reduced potential difference with dialyzate
a consequence of a reduced active Na transport,
ce the short-circuit current was reduced while
tissue resistance remained unchanged. It is
cluded that the choleragenic material responsi-
for the overt fluid accumulation in this
el is not the same as the material responsible
Na pump inhibition, but the evidence presented
not exclude a role of the latter in the
duction of cholera stool in man.

9 ACTIVE SODIUM TRANSPORT ACROSS RABBIT
ILEUM IN EXPERIMENTAL CHOLERA INDUCED
BY CHOLERAGEN. (E.) Norris, H. T. (Harvard Med.
Sch., Boston, Mass.), S. G. Schultz, P. F. Curran
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193-196, 1967.

The effect of choleragen (a moiety isolated from Cholera vibrio) on Na ion transport across short-circuited segments of adult (New Zealand white) rabbit ileal loops was studied; short-circuiting was accomplished by bathing both surfaces of the isolated tissue with soln. of identical composition and, at the same time, passing sufficient current through the tissue to abolish the spontaneous transmural electrical potential difference. Under these conditions the electrochemical potential for Na in the mucosal soln. is equal to that in the serosal soln. so that net transport of Na from 1 soln. to the other cannot be the result of passive ionic diffusion. A total of 40 μg of choleragen in a total vol. of 1 ml was instilled into the lumen of 1 loop and 1 ml of sterile physiologic saline was instilled into the adjacent loop. No difference in the rate of active Na transport could be demonstrated between in vitro segments of choleraic and control tissues. Histologic examination demonstrated no epithelial discontinuity, but only congestion of submucosal and villous vessels, discharge of mucus and dilatation of the central lacteal.

11220 GEOGRAPHICAL DISTRIBUTION OF GASTRO-INTESTINAL CANCERS IN INDIA WITH SPECIAL REFERENCE TO CAUSATION. (E.) Malhotra, S. L. (Western Railway, Bombay, India). Gut 8(4):361-372, 1967.

An analysis of 470 cases of gastrointestinal cancers seen among the railway populations in various parts of India over the 5-yr. period 1960-1964 is presented; the data given are representative of the entire country, except the extreme eastern regions: Assam and parts of North Bengal. Sex distribution revealed 363 (77.2%) of the cancers were in males and 107 (22.8%) were in females. A total of 183 (39%) were cancers of the buccal cavity; this location for cancer was 4-fold more prevalent among men, and found its peak incidence among those aged 35-55 yr.; it was relatively less common in the south than in the north and east. Cancer of the esophagus accounted for 53 (11%) of 470; it was 7-fold more common among men, and constituted 55% of all cancers in the west and south of India. Cancer of the stomach constituted 18% (83 of 470) of all gastrointestinal cancers in this study; it was 4-fold more common in the south of India; the male:female ratio was 7:1 for the series as a whole, but in south India it was 20.1; it was most prominent in the 35-55-yr.-old-age group in the south, compared to 45-55 yr. old group in the north. There were 26 cases of hepatoma and 12 carcinomas of the gallbladder, constituting 38 (8%) of 470 cancers; it was 12-fold more common in the north than in the south; cancer of the liver was 1.5 times more common in males, and cancer of the gallbladder was 3 times more common in females. There were no significant geographical differences found for cancer of the rectum and colon. Eight cases of pancreatic cancer were recorded, being most common in south India. The geographical distribution of oropharyngeal cancers confirmed the association with betel chewing, but it is suggested that the irritation from the highly alkaline lime, and not the tobacco leaf, on the betal nut in the chewing quid, predisposes towards malignant changes in the buccal mucosa. The association of higher gastric cancer rates with lower hepatoma rates in 1 area of the country, and the reverse in another area, suggests that in the development of these neoplasms there may be common etiological factors, most of which are dietary. The pattern of diet and eating influences flow rates of bile, and the possible role of flow rates of bile in the pathogenesis of gastric carcinoma, on the one hand, and hepatoma and cancer of the gallbladder on the other, is considered. Geographical differences in the incidence rates of cancer of the colon appear to be related to dietary factors. A hypothesis is presented that malignant disease involving mucous membranes may be due to chronic interaction of an abnormal alkaline milieu on the intracellular mucus of the mucous cells of epithelium.

11221 PATHOMECHANISM OF COLI DYSPEPSIA. (Ger.) Kühn, B. (Karl Marx U., Leipzig, Germany), W. Raue and U. Willnow. Zbl. Bakt. [Naturwiss.] 203(2):172-176, 1967.

Of 28 infants who died of multiple infectious diseases, 24 had coli dyspepsia listed among the other often-related conditions diagnosed. Bacterial inocula from the small and large intestines, mesenteric lymph nodes, liver, and spleen was obtained. Histological investigations of the small and large intestines disclosed abnormal situations in every case. In most cases the Grünhagen subepithelial spaces were widened; more or less strong lymphocyte or plasma cell infiltration with occasional eosinophils in the mucosa and sloughing of the epithelial and goblet cells were evident. In a few cases spotty necrosis of the mucosa and bacterial colonies mixed with mucus and dislodged epithelial cells were seen. The submucosa regularly showed a slight edematous infiltrate containing a few round cells. Lymphatic tissue was strongly activated. Fluorescent microscopy revealed Escherichia coli (0111:B4) in 13 cases. The bacteria were well-differentiated with a yellow-green fluorescence of the capsules; in all 13 cases these bacteria were evident only in the intestine and in the intestinal contents. In contrast to the fluorescent method bacteriological proof of the strain of the organism occurred in only 8 instead of 13 cases.

11222 SERUM ANTIBODY RESPONSES TO INTESTINAL IMPLANTATION OF ANTIGENS IN RATS. (E.) Copper, G. N. (U. Melbourne, Australia) and J. C. Thonard. J. Path. Bact. 93(1):213-221, 1967.

Male albino rats were prepared with isolated intestinal loops by ligating 2 points approx. 4 cm apart at the ileojejunal region in such a manner that at least 1 Peyer's patch was include in the isolated portion of intestine. Control and operated animals received 0.2 ml of Shigella dysenteriae type-II suspension, containing 1 x 1 organisms s.c. The antibody response was simila in both groups of animals, showing that neither the stress of the operation nor recovery from it affected the capacity of animals to respond to this primary antigenic stimulus. Operated animals were given graded doses of antigen (rang from 10^5 to 10^9 organisms given in 0.1 ml vol.) by the i.p. and intraloop routes, and also grade doses of Shigella dysenteriae II endotoxin which ranged from 0.005-5 µg in 0.1 ml vol. No signif cant difference between the 2 routes of admin. were detected when the antigen dose was = to or greater than 10^7 organisms, but the i.p. route was more effective than the intraloop route when smaller doses were used. The primary serum antibody responses to graded doses of the bacter flagella antigen extracted from Salmonella enteritidis were compared; the antigen was given i.v. or in the isolated intestinal loop. The i.v. route seemed more effective when doses of 0.1 and 0.01 µg were used; with lower doses the results suggested that the intestinal route evok a more prolonged serum antibody response. Group of rats were also given doses of S. dysenteriae II endotoxin and S. enteritidis flagella intrajejunally and by the isolated intestinal loop; whereas the intrajejunal route was more effecti in producing a serum antibody response when endotoxin was used as antigen, the reverse prevailed with flagella, where even a dose of 0.1 µg elicited only minimal antibody titers. It is concluded that the isolated intestinal loop can have antigens inj. into it as a means of studyi the immunological reactivity of animals to anti in the intestine, and that animals produce seru antibody to titers similar to those elicited by parenteral inj. of several bacterial antigens.

11223 IMMUNOLOGICAL REACTIVITY ASSOCIATED W ANTIGENS IN THE INTESTINAL TRACT OF RATS. (E.) Cooper, G. N. (U. Melbourne, Austr ia), W. J. Halliday and J. C. Thonard. J. Path Bact. 93(1):223-233, 1967.

Shigella dysenteriae II endotoxin was labeled b incubation at 37°C with ^{51}Cr, and rats were giv 0.1 ml of a 20 µg/ml saline soln. of this by me of an intestinal loop. Salmonella adelaide flagellar material was labeled with ^{125}I, and rats were given 5 µg of this material in 0.1 ml of saline. The relative number of plaque-formi cells in spleen, mesenteric lymph nodes and Peyer's patches was assessed in rats given inj. of S. dysenteriae antigen. The bulk of the ^{51}Cr-labeled endotoxin remained in the isolated intestinal loop for a considerable period of ti after inj.; a small, but significant, amount of radioactivity was absorbed from the loop; most of this localized in the liver, although betwee

-10% was detected in other organs, particularly e spleen, thymus, kidneys and adrenals. Small nounts of radioactively labeled flagella or dotoxin accumulated in lymphoid tissue other an that associated with the intestinal loops, d may provide sufficient antigenic stimulus for generalized reticuloendothelial response. This s supported by the observation that animals inj. th flagellar antigen through the intestinal op respond to i.v. inj. in a characteristic condary-type manner. Early development of tibody-producing (plaque-forming) cells curred in the spleen of animals in which *S. senteriae* II antigen was inj. into the loop. though significant numbers of these cells also cumulated in the lymphoid tissue of the intes- nal loop, this did not occur until the splenic ll response and serum antibody titer declined. ese results provide little support for the pothesis that intestinal lymphoid tissue may ntribute significantly to the immunological sponse of animals to intestinal antigens.

224 SALMONELLOSIS COMPLICATING SCHISTOSOMIASIS IN EGYPT. A NEW CLINICAL APPRECIA- ON. (E.) Hathout, S. E. (Ein-Shams U., Cairo, ypt), Y. Abd El-Ghaffar and A. Y. Awny. *Amer. Trop. Med.* 16(4):462-472, 1967.

inical and laboratory studies of 61 patients th schistosomiasis and 21 patients without nistosomiasis, with infection with enteric ganisms, principally *Salmonella paratyphi* A, vealed that this infection complicated by nistosomiasis with hepatic fibrosis has a aracteristic picture, which is different from at of classic enteric infection in patients thout schistosomiasis. Of 61 with schistosomia- s, 10 (16%) had typhoid, 50 (82%) had paratyphoid and 1 (2%) had paratyphoid B. Most patients ve a history of sudden onset of illness; these so had fever of long duration, frequent chills d terminal hematuria. In most cases the liver s either decreased in size or, more commonly, derately enlarged. The spleen was enlarged d firm in all but 1 case. Abdominal examination d not reveal any significant tympanites or nderness, contrasting vividly with the abdomen cases of enteric infection in the absence of nistosomiasis. Treatment for enteric infection cluded 500 mg of chloramphenicol p.o., and for nistosomiasis, it was 12 i.m. inj. of a 6% soln. stibophen. Prolonged fever occurred in 35 of patients; after admin. of chloramphenicol the nperature returned to normal, but frequent apses occurred after 7-10 days of apyrexia ter cessation of the drug. Termination of fever ter therapy with chloramphenicol occurred rlier in patients with schistosomiasis than in se without it. In 35 with prolonged fever, od cultures were positive in 33: 2 with hoid and 31 with paratyphoid A. There was a lerate rise in the eosinophil count in patients h schistosomiasis and enteric infection. In cases, there were *Schistosoma hematobium* eggs the urine. In 16 of 17 cases of prolonged fever, enteric organisms were recovered from both blood and urine. Viable eggs of *Schistosoma mansoni* were found in the stools of 5 patients. Of 61 patients with schistosomiasis and enteric infection, 6 (10%) had the classic enteric fever, and 55 (90%) had a remittent type of fever. It was noteworthy that neither intestinal perforation nor bleeding was encountered in any of the 61 cases of schistosomiasis with enteric infection. The concept that enteric infection in patients with schistosomiasis is essentially a urinary-tract infection is strengthened by this study.

11225 ENHANCEMENT OF BACTERIAL INFECTION BY MECONIUM. (E.) Bryan, C. S. (Johns Hopkins U. Sch. Med., Baltimore, Md.). *Johns Hopkins Med. J.* 121(1):9-13, 1967.

When admin. to mice i.p. along with *Escherichia coli*, meconium consistently reduced the LD_{50} (organisms/mouse), compared to uncontaminated saline or amniotic fluid used for bacterial suspension. The factor by which the LD_{50} was reduced ranged from 7.5-6800 and, as with previously studied mucinous substances, it varied in direct proportion to the amount of meconium admin. When admin. intratracheally to rats along with *E. coli*, meconium reduced in each instance the number of bacteria required to cause death by bronchopneumonia. The magnitude of this effect paralleled that of the LD_{50} determinations in mice. Sterile meconium was never fatal in control experiments, although the statement that meconium has low-grade toxicity seemed substantiated from the external appearances of the animals. It is suggested that meconium reduces host resistance to bacterial infection in a manner similar to that of hog gastric mucin. Meconium may contribute to the course of infection in meconium peritonitis and meconium aspiration pneumonia.

11226 PATHOGENESIS OF *ESCHERICHIA COLI* ENTERITIS IN THE LIGATED RABBIT GUT. (E.) Drucker, M. M. (Shaare Zedeck Hosp., Jerusalem), R. Yeivin and T. G. Sacks. *Israel J. Med. Sci.* 3(3):445-452, 1967.

Six of 8 strains of *E. coli* which had been isolated from babies with infantile gastroenteritis produced accumulation of fluid within the intestinal lumen and inflammatory changes in the intestinal wall of ligated rabbit intestinal sections. These 10-cm alternate segments which had been inj. with an enteropathogenic strain of *E. coli* were sometimes dilated; the dilatation became visible when the index of fluid accumulation was greater than 3. The dilated segments contained opalescent gray or bloody fluid and occasionally gas. Further study with these strains plus some from healthy babies showed a correlation between fluid accumulation, inflammatory changes in the intestinal wall, adherence of bacteria to the surface epithelium and penetration of bacteria into the deeper tissues. Thus the index of fluid accumulation may serve as an objective measure of enteropathogenicity. Immunofluorescent staining of bacteria in intestinal sections demonstrated the extensive adherence of some strains of E. coli to intestinal epithelium and the penetration of bacteria through the epithelium into the intestinal wall. This was confirmed by culturing the same strains from mesenteric venous blood while cardiac blood remained sterile. It is possible that the ability of these strains of E. coli to adhere to the intestinal epithelium or to penetrate it (or both) may explain their enteropathogenicity.

11227 SALIVARY FLOW RATES AND IODIDE TRAPPING CAPACITY IN PATIENTS WITH SJÖGREN'S SYNDROME. (E.) Mason, D. K. (Western Infirm., Glasgow, Scotland), R. McG. Harden, J. A. Boyle, M. K. Jasani, J. Williamson and W. W. Buchanan. Ann. Rheum. Dis. 26(4):311-315, 1967.

In 14 patients with confirmed Sjögren's syndrome, sialographic results, salivary flow rates, and saliva plasma ^{132}I ratios are reported with the view of determining the iodide-trapping capacity in this condition. Sialography was normal in 5 patients and abnormal in the remaining 9 patients, with sialectasis being punctate in 1 patient, globular in 2 patients and cavitary in 3 patients. Seven of these 9 patients demonstrated atrophic changes. Salivary flow rates in 83 normal subjects as measured under conditions of rest, as well as under fruitgum and lemon juice stimulation were 0.059 ± 0.039, 0.36 ± 0.92, 1.70 ± 0.69 ml/min., resp. Under resting conditions in 8 patients with Sjögren's syndrome, there was no saliva measurable, 7 of these patients having abnormal sialograms. Under stimulation (both types) 8 patients, all of whom had abnormal sialograms, showed abnormally low salivary rates. In 3 of these latter patients, no salivation was observed after max. stimulation; two of these patients showed cavitary and 1 showed globular abnormalities, resp. All 5 patients with normal sialograms revealed normal flow rates, however. There was an indirect relationship between sialography and the saliva plasma ^{132}I ratio. Only 1 patient with an abnormal sialogram (severe cavitary changes) had an abnormal saliva plasma ^{132}I ratio. The remaining 5 patients with both Sjögren's syndrome and abnormal sialograms had ratios which were not significantly different from normal values. These findings indicate that there is no change in the salivary trapping capacity of iodide in Sjögren's syndrome, except in cases which present severe sialectasis.

11228 HEMORRHAGE AND NECROSIS OF THE STOMACH AND BOWEL DUE TO ATHEROEMBOLISM. A CORRELATIVE STUDY OF ATHEROMATOUS EMBOLI TO THE GASTROINTESTINAL TRACT IN HUMANS AND EXPERIMENTAL ANIMALS. (E.) Anderson, W. R. (Hennepin County Gen. Hosp., Minneapolis, Minn.), A. M. Richards and L. Weiss. Amer. J. Clin. Path. 48(1):30-38, 1967.

Widespread embolization of cholesterol is described in 3 patients (all male; 65-74 yr. old) in whom involvement of the gastrointestinal tract was shown by minute mucosal hemorrhages, necrosis and re-epithelialized ulcers. Two of the patient had progressive wt. loss and recurrent episodes of melena from an undetermined site; autopsy revealed widespread multiple-system atheromatous embolization, including extensive involvement of the stomach and the large and small intestines. Embolized submucosal arteries and arterioles were occasionally associated with minute re-epithelialized mucosal ulcerations, and rare gastric microinfarcts were found in 1 patient. In correlative experimental studies, gastrointestinal lesions were readily produced in rabbits (New Zealand strain) after inj. of atheromatous suspension (20-45 mg/ml) by retrograde aortic catheterizatic The kidneys and gastrointestinal tract were uniformly and most extensively involved and the severity and extent of the lesions paralleled th conc. of atheromatous suspension inj. Although these lesions were often severe and extensive, those of lesser degree which had been induced by the more dilute suspensions closely simulated those seen in the 3 patients described. These observations indicate that embolization of cholesterol to the gastrointestinal tract may be frequent and significant, but difficult or impossible to detect clinically and radiographical they may be overlooked easily at autopsy because of the minute size, transient nature and rapid re-epithelialization of the resultant lesions. Recurrent melena, which was a prominent feature in 1 patient, seemed to be accentuated by anticoagulant therapy; it is therefore suggested tha use of anticoagulants in patients manifesting multiple-system embolic phenomena, possibly resulting from cholesterol crystals, is contraindicated.

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See also abstract nos.: 11030,11522

11279 PRESSURE CHARACTERISTICS OF REFLUX ESOPHAGITIS. (E.) Affolter, H. (U. Clin. Basel, Switzerland). Helv. Med. Acta 33(5): 395-402, 1967.

Esophageal pressure studies and esophagoscopy were performed on 48 patients (22 men, 26 women; 21-69 yr. old) with reflux esophagitis; there were 28 with mild esophagitis characterized by hyperemia, edema and friability of the esophageal mucosa and 20 with severe esophagitis, which, in addition, showed ulceration and/or bleeding. Findings of esophagoscopy were correlated with esophageal pressure studies. The degree of esophageal motor dysfunction paralleled to some degree the severity of the esophagitis. Patients with mild esophagitis showed, as a rule, normal motor activity or evidence of spastic motor incoordination of the esophagus and its lower sphincter after swallowing. In most patients with severe esophagitis, deglutition was followed by weak, often simultaneous, contractions of the distal esophagus and impaired relaxation and contraction of its lower sphincter. Complete motor failure of the esophagus was seen in a small number of patients with severe esophagitis. Manometric studies in reflux esophagitis are not primarily of diagnostic value, but they may be used as a guide to treatment.

11280 HIATAL HERNIA IN INFANTS. (E.) Lilly, J. R. (George Washington U., Washington, D. C.), J. LoPresti and J. G. Randolph. Southern Med. J. 60(5):545-548, 1967.

A series of 35 children less than 1 yr. old with esophageal hiatal hernia is described; diagnosis was by upper gastrointestinal X-ray series in each case; all were sliding hernias and all children were symptomatic from the hernia. The mean follow-up in this series was 13 mo. Major presenting symptoms included vomiting in 34 (97%), failure to thrive in 19 (54%), aspiration pneumonia in 11 (31%) and bleeding in 13 (37%). Esophagoscopy was performed on 15 (43%) of the patients. Initially all 35 patients were given a trial of conservative medical management; this included maintenance of continual upright position (angle of 60°) for at least 3 mo., and small, thickened and frequent feedings; 24 patients responded satisfactorily and were considered medical successes because of reversal of symptoms; there were 11 failures and 1 death. Ten of the 35 children required surgical correction of the hiatal hernia because of failure of medical management. In all cases an Allison method of repair (utilization of the phrenicoesophageal ligaments and posterior approximation of the crura) was used; the surgical approach was equally divided between the abdominal and thoracic routes. Pyloroplasty was done in 3 patients. Surgical treatment was successful in all cases. It is concluded that hiatal hernia of the esophageal hiatus is a surprisingly common gastrointestinal abnormality in children, and is commonly overlooked as a cause of certain gastric symptoms in early infancy.

11281 PECULIARITIES OF MOTOR FUNCTION OF THE SMALL INTESTINE IN PATIENTS WITH A ARTIFICIAL ESOPHAGUS CONSTRUCTED AFTER THE ROUX-HERZEN-JUDIN TECHNIC. (Rus.) Rusanov, A. A. (Leningrad Pediat. Med. Inst., USSR), N. A. Ivanova and B. T. Kats. Vestn. Khir. Grekov. 98(6):10-14, 1967.

The cancerous esophagus of 35 patients was remov (4 mo.-7 yr. previously) by the method of Roux, Herzen, and Judin and an artificial esophagus wa formed from jejunum. In 32 cases the esophagus was connected directly to the small intestine, excluding the stomach and duodenum. Difficulti in digestion or evacuation did not occur in 26 these persons; 8 had moderate difficulties afte eating; and 1 had steady hunger plus a markedly decreased level of serum albumin. X-ray examina tions revealed that the deglutition of all patients was normal. In those patients without digestive problems, $BaSO_4$ suspension passed easily through the natural portion, through the anastomosis, and the artificial part of the esophagus; it then penetrated into the jejunal loops. Intensive peristalsis of the artificial part of the esophagus was observed. Food mixed with $BaSO_4$ or plain $BaSO_4$ was not retained at the site of anastomosis. Backward penetration of the food through the duodenum into the stomach occurred very rarely. The passage of the food through the small intestine was slowed down by 2-16 hr. and the food was partially retained in reservoir-like enlargements formed in some of the jejunal loops; the food reflex of these patients was decreased or abolished. Apparently the delayed passage of food through the intestinal tract plays an important role in the restoration, after surgery, of the digestive function. In patients with moderate digestive difficulties, delayed passage of the food through the small intestine and the formation of reservoir-like enlargements in the intestinal tract were not observed; the food reflex of these patients was marked. In the patient, who suffered from serious digestive difficulties, an accelerated passage of the food through the intestinal tract occurred and the food reflex was extremely pronounced.

11282 ESOPHAGEAL DYSFUNCTION IN DIABETIC NEUROPATHY-GASTROENTEROPATHY. CLINICAL AND ROENTGENOLOGICAL MANIFESTATIONS. (E.) Mandelstam, P. (U. Kentucky Coll. Med., Lexington) and A. Lieber. J.A.M.A. 201(8):582-586 1967.

14 patients with diabetic neuropathy-gastro- teropathy, cineradiographic examination of the ophagus revealed clearcut signs of esophageal sfunction in 12 cases. In marked contrast to is high incidence of dysfunction, symptoms re- rable to the esophagus were present in only 3 tients: substernal burning upon ingestion, e sensation of slow passage of food through e suprasternal notch and dysphagia. The primary ristaltic wave was absent in 3 patients and re- ced in 9. Tertiary contractions were frequent 1 and occasional in 6. There was delayed ophageal emptying in the recumbent position in patients; in 2 of these, emptying was also de- yed when they were recumbent. Five patients ibited slight dilatation of the esophagus. No ient exhibited a breach in the cricopharyngeal incter or any cineradiographic evidence of dys- ction in the initiation of swallowing. The n age of the patients was 45 yr.; 6 were under e age of 35 yr. and only 5 were over 50. The n known duration of diabetes mellitus was 16 and the mean known age of onset of diabetes litus was 16 yr. and the mean known age of et of diabetes was 29 yr. Except for insulin, e patients were receiving no medications at the e of testing.

83 RELEVANCE OF DIAGNOSTIC PNEUMOMEDIASTINUM AS A METHOD FOR EXAMINATION OF ESOPHAGEAL EASES.

(Cz.) Holub, E. (Palacky U., Olomouc, choslovakia) and C. Šimeček. Cas. Lek. Cesk. (24):640-643, 1967.

parallel with X-ray examination and esophag- opy, diagnostic pneumomediastinum was used to study 56 patients with esophageal diseases with cancer of the esophagus and of the phagocardial sector, 17 cases with benign tumors the esophagus, and 5 cases with compression the esophagus by metastases of a bronchogenic cinoma). This method is designed mainly for examination of the outer esophageal wall. lowing bronchoscopy, the pertracheal insuf- tion into the mediastinum was carried out by . of 250 ml O_2 through a long needle intro- ed between the tracheal and the esophageal ls. After the insufflation the bronchoscope h the needle was removed and stratigraphic mination was performed. The negative contrast the insufflated O_2 made it possible to visualize outer wall of the esophagus, whereas the inner l was visualized by swallowed $BaSO_4$ suspension. gnostic pneumomediastinum permits assessment the size, and the shape of the esophageal or with a high degree of accuracy. It is also sible to determine by this method whether the or did or did not propagate into the adjacent ans; here a negative finding is much more re- ble. This method can be used also for follow- the effect of X-ray therapy on esophagus ors and is suitable to estimate the size of lymph nodes in the mediastinum and to dif- entiate increased nodes due to inflammation m those enlarged due to metastatic growth. method has only a limited value for diagnosis esophageal diseases other than cancer.

11284 STUDIES ON THE LETHAL COMPLICATIONS OF HIATUS HERNIA.

(Ger.) Kieser, C. (U. Zurich). Gastroenterologia (Basel) 107(5): 328-336, 1967.

The incidence and mortality of hiatus hernia in Switzerland is surveyed. Annual mortality is 8.1/million residents, about 6.7% that of gastric and duodenal ulcers or 7.7 of that from cholelithiasis; 4.6 deaths/million/yr. occur in relation to surgery for hiatus hernia; the remainder, 3.7 deaths/million/yr., occur mainly among children dying from persistent vomiting, aspiration pneumonia or esophageal stricture in adults, not operated upon, the hernia is not more than a contributory cause of death. Lethal complications of hiatus hernia observed in 22,003 autopsies performed during a 10-yr. span included 14 deaths resulting from hernia surgery, 5 from esophagitis, 1 from aspiration pneumonia, 1 from cardia carcinoma, 3 from esophageal ulcers, and 2 from gastric ulcer; a total of 26. The mortality in the author's practice during operation on 344 patients was 2.7%; postoperative deaths were 14 and included 4 from perforations in the field of operation, 4 from lung emboli, 2 from anesthetic accident (postoperative apnea) and 1 each from bronchopneumonia, hemorrhage due to increased clotting time, staphylococcus-infection enteritis, and collapse of unknown origin.

11285 EXPERIMENTAL CONTRIBUTION TO THE RECONSTRUCTION OF THE CLOSING MECHANISM AFTER MYOTOMY OF ESOPHAGOGASTRIC JUNCTION.

(Cz.) Kralik, J. (Palacky University, School of Med., Olomouc) and T. Kofanova. Cas. Lek. Cesk. 106(24):644-647, 1967.

Radical myotomy by Heller's method should be performed in operations of esophageal achalasia. Since, radical myotomy eliminates the dysfunctional sphincter of the esophagogastric junction, the reconstruction of the closing mechanism of this junction was investigated. Eight dogs were operated upon using left-side thoracotomy; the esophagogastric junction was released and on its left, anterior part, extra mucosally, a longitudinal myotomy was performed. The myotomy covered the entire region of the closing mechanism and reached to the stomach; the Helvetius muscle of 4 of the 8 dogs was also cut. The Dor-Thal and the Jezior methods were used for the reconstruction of the closing mechanism in each of 4 animals. The dogs were observed for up to 27 wk. after the operation; they did not show any symptoms of dysphagia and X-ray examination of the stomach and esophagus was performed at various intervals (9-37 days) after surgery. The $BaSO_4$ suspension passed easily through the esophagus and the esophagogastric junction; reflux from the stomach into the esophagus did not occur. Seven dogs were sacrificed 1-26 wk. after surgery where the esophagogastric junction and the gastric fundus were seen to be firmly fixed below the diaphragm and the formation of abdominal esophagus was clearly discernible. Esophagitis was not detected. The results of the present study may be of clinical importance since the conditions for the reconstruction of the closing mechanism are more favorable in man than they are in the dog.

11286 BEHAVIOR OF THE CARDIA IN CHAGASIC ESOPHAGOPATHY. PHYSIOPATHOLOGY OF CHAGASIC ESOPHAGOPATHY. (Por.) Pessoa, J. (Pio XII Hosp., Sao Gotardo, Brazil) and C. Mesquita. Rev. Brasil. Med. 24(5):359-364, 1967.

11287 ANESTHESIA IN BRONCHOSCOPY AND ESOPHAGOSCOPY. THREE YEARS EXPERIENCE. (Fr.) Hanquet, M. (Baviere Hosp., Leige, France) and J. Marechal. Acta Anaesth. Belg. 17(2):77-82, 1966.

11288 STUDIES ON THE 2ND STAGE OF DEGLUTITION BY CINERADIOGRAPHIC METHOD. (E.) Tanahashi, T. (Nagoya U. Sch. Med., Japan). Nippon Jibiinkoka Gakkai Kaiho (J. Otorhinolaryng. Soc. Jap.) 70(7):1255-1285, 1967.

11289 RADIOLOGIC STUDY OF ESOPHAGEAL VARICOSE VEINS. (Rum.) Debău, M. (Gastr ent. Ctr., Bucharest), A. Oproiu, S. Tacorian, E. Marinescu, Ma. Debău, O. Hoanca, M. Russu and M. Ionescu. Oncol. Radiol. (Bucur.) 6(2):137-140, 1967.

11290 ESOPHAGEAL ATRESIA AND TRACHEO-ESOPHAGEAL FISTULA. (E.) Holder, T. M. and K. W. Ashcraft. Chicago, Year Book Medical Publishers, 1966, 68 pp., $2.00.

11291 TRAUMATIC VOMITING. THE MALLORY-WEISS SYNDROME. (E.) Young, H. (Emory U. Med. Sch., Atlanta), S. W. Gray and J. E. Skandalakis. J. Med. Ass. Georgia 56(9):362-364, 1967.

11292 TWO CASES OF BENIGN TUMORS OF THE UPPER THORACIC ESOPHAGUS. (Fr.) Maruelle, R. (Cent. U. Hosp., Rennes, France) and P. Etienne. Ann. Chir. 21(13-14):857-863, 1967.

11293 TREATMENT OF ADVANCED CANCER OF THE ESOPHAGUS. (Fr.) Bickford, B. G. (Broadgreen Hosp., Liverpool, England). Rev. Med. Moyen Orient 24(2):142-144, 1967.

11294 PARA-ESOPHAGEAL BRONCHOGENIC CYSTS. THREE CASES. (Fr.) Delacroix, R. (Calmette Hosp., Lille, France), R. P. Buffin, C. Wallaert, C. Poitreau and C. Voisin. Ann. Chir. 21(13-14):875-878, 1967.

11295 STUDY ON VENTILATORY FUNCTION AFTER ESOPHAGEAL SURGERY-- ITH SPECIAL REFERENCE TO THE EFFECT OF LEFT THORACO-ABDOMINA APPROACH ON VENTILATORY FUNCTION. (Jap.) Ban, S. (Keio U. Sch. Med., Tokyo). Nippon Kyobugeka Gakkai Zasshi (J. Jap. Ass. Thorac. Surg.) 15(7) 720-732, 1967.

11296 CARBOHYDRATE TOLERANCE TEST AFTER ESOPHAGOPLASTY. (Pol.) Sołtys, W. (3rd Surg. Clin., Wroclaw, Poland), A. Markowska S. Piegza and T. Rosińska. Pol. Przegl. Chir. 39(8):795-799, 1967.

11297 PLASTIC PROCEDURES IN THE TREATMENT OF PEPTIC STENOSES OF THE ESOPHAGUS. (Fr Ribet, M. (Cent. Hosp., Lille, France) and P. Quandalle. Lille Chir. 22(3):173-180, 1967.

11298 CICATRICIAL STENOSIS OF ESOPHAGOENTERO STOMY AND ESOPHAGOGASTROSTOMY. (Rus.) Peterson, B. E. (Inst. Exp. Clin. Oncol., Moscow O. A. Malysheva and V. I. Plotnikov. Khirurgiia (Moskva) 43(8):78-85, 1967.

11299 REPAIR OF DEFECTS OF THE CERVICAL ESOPHAGUS IN MAN BY ANASTOMOSING OF TH ARTERIES AND VEINS OF A JEJUNAL LOOP TO THE CERVICAL VESSELS. (Turk.) Iskeceli, O. (Fac. Med., Istanbul) and B. Görgün. Tip Fak. Mec. (Istanbul) 29(4):651-657, 1966.

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11301 CHEMICAL BURNS OF THE ESOPHAGUS IN CHILDREN. (Rus.) Biezin, A. P. Mosc Meditsina, 1966, 191 pp.

11302 CARDIOVASCULAR CHANGES DUE TO DIAPHRAG TIC HERNIA AND CARDIOSPASM. ANGIOCARDIOGRAPHIC STUDY. (E.) Steinberg, I. (New York Hosp.-Cornell Med. Ctr., New York, N. Y.). New York J. Med. 67(19):2586-2595, 1967.

11303 TRAUMATIC DIAPHRAGMATIC HERNIAS. (Pol Dowgird, A. (Sniadeckii Military Hosp. Bialystok, Poland) and Z. Korfel. Pol. Tyg. Lek 22(36):1376-1378, 1967.

11304 DIAPHRAGMATIC HERNIAS THROUGH THE STERNOCOSTAL SLITS. (Rum.) Dimitresc I. (2nd Med. Clin., Cluj, Rumania), L. Gheorghiu and I. Ticlete). Oncol. Radiol. (Bucur.) 6(2): 117-121, 1967.

1305 CONGENITAL OESOPHAGEAL ACHALASIA IN THE
DOG. (E.) Earlam, R. J. (Mayo Grad.
ch. Med., Rochester, Minn.), P. E. Zollman and
H. Ellis, Jr. Thorax 22(5):466-472, 1967.

306 SURGICAL TREATMENT OF ACHALASIA. (E.)
Sawyers, J. L. (Vanderbilt U., Nashville,
nn.) and J. H. Foster. Dis. Chest. 52(3):310-
4, 1967.

307 SURGICAL TREATMENT OF ENDOBRACHYESOPHAGUS.
(Fr.) Naef, A. P. (Yverdon Hosp.,
itzerland). Ann. Chir. 21(13-14):865-867, 1967.

308 CONTRIBUTION TO THE STUDY AND INTERPRETA-
TION OF INTRAMURAL NERVOUS CHANGES IN
HALASIC MEGALESOPHAGUS. (It.) Caraco, A. (U.
Naples, Italy) and D. Lanzara. G. Ital. Chir.
22(6):643-663, 1966.

11309 FUNCTIONAL DISTURBANCE IN HIATAL HERNIA IN INFANTS AND CHILDREN. (E.) Chrispin, A. R. (Hosp. Sick Child., London) and G. W. Friedland. Thorax 22(5):422-430, 1967.

11310 CLINICAL ASPECTS OF HIATAL GASTRIC HERNIA. (It.) Brovarone, F. (Biella Hosp., Italy). Minerva Med. 58(55):2541-2544, 1967.

11311 HIATAL HERNIA AND REFLUX ESOPHAGITIS AS A CAUSE OF DIGESTIVE HEMORRHAGE. (Sp.) Carrasco Pena, R. (Aguirre Hosp., Santiago, Chile). Rev. Med. Valparaiso 20(2):52-56, 1967.

See also abstract nos.: 11441,11640,11743

11312 A CHROMATOGRAPHIC MODIFICATION OF THE TETRACYCLINE FLUORESCENCE TEST FOR GASTRIC CANCER. (E.) Ibsen, K. H. (U. California, Los Angeles), J. E. Berk and A. M. Morimoto. Cancer Res. 27(7):1296-1300, 1967.

Separation of demethylchlortetracycline from fluorophores native to many samples of human gastric sediment was achieved by cellulose column and paper chromatographic technics; these technics were devised to enhance the crude tetracycline test for gastric cancer by making it quantitative and objective. Gastric sediments obtained from 29 subjects without gastric cancer and 9 patients with proved gastric cancer, after the prior admin. of demethylchlortetracycline (150 mg, 4 times/day for 5 consecutive days p.o.), were examined by means of these chromatographic methods. Paper chromatography demonstrated demethylchlortetracycline fluorescence only in the samples obtained from patients with gastric cancer. Quantitative estimation of demethylchlortetracycline also showed that the amount recovered from the sediments of the cancer patients was in each case significantly greater than in the noncancer subjects (2.2-20 µg/ml in cancer against 0-0.9 µg/ml in noncancer patients). These preliminary observations suggest that the chromatographic methods described may provide a basis for performing the tetracycline fluorescence test for gastric cancer with greater specificity and reliability.

11313 5-FLUOROURACIL THERAPY FOR CANCER OF THE STOMACH. (E.) Blokhina, N. G. (Inst. Exp. Clin. Oncol., Moscow) and N. N. Blokhin. Cancer 20(5):668-672, 1967.

Over a 3-yr. period, 250 patients were treated with 5-fluorouracil for advanced gastric carcinoma; good results (tumor regression and improved general status) were obtained in 50% of the cases. In some cases, roentgenologic studies showed complete disappearance of the tumor. These results differ from published reports of chemotherapy of gastric neoplasms, which generally report low sensitivity of gastric carcinoma to 5-fluorouracil. Since the drug is markedly toxic, its use is limited, but methods developed at the Institute for Experimental Clinical Oncology made it possible to decrease the toxic effects. The basic regimen of treatment consisted of daily i.v. inj. of the drug on consecutive days (15 mg/kg; no single dose exceeding 1 g), and then half of the dose was admin. every other day for a total of 2-3 admin., until the first symptoms of toxicity appeared; each patient received a total dose of 5-7 g of 5-fluorouracil. The admin. of the drug every other day lessens its cumulative effect, which in turn allows increasing single doses without a consequent rise in toxicity. The action of 5-fluorouracil was greater in treating primary tumors and relapses, and was less pronounced in its effect in the treatment of metastases. It is suggested that combined chemotherapy (use of 5-fluorouracil and agents with other mechanisms of action) will give better results.

11314 GASTRIC CANCER AND DIET. A PILOT STUDY ON DIETARY HABITS IN TWO DISTRICTS DIFFERING MARKEDLY IN RESPECT OF MORTALITY FROM GASTRIC CANCER. (E.) Dungal, N. (U. Iceland, Reykjavik) and J. Sigurjonsson. Brit. J. Cancer 21(2):270-276, 1967.

In questionnaires covering approx. a 10 yr. period given to the closest possible relatives of people dying from gastric cancer in 2 districts of Iceland, emphasis was placed on the total consumption of smoked and singed foodstuffs along with the frequency of preparation of all common foods during the summer and winter seasons, the number of animals killed for home use and the number of carcasses smoked. The smoked food consumption in the 2 districts did not differ significantly, with the mean frequency of total consumption being the same. Singed food consumption was higher in the area which evidenced the higher standardized mortality rate for gastric cancer (Northern district with a rate of 143.7 and southern district with a rate of 75.5). A variation pattern in the various types of foods (smoked and salted foods, singed sheep heads, potatoes) prepared and served was observed between the 2 districts. The 3,4-benzopyrene levels of smoked and singed foods was higher also in the northern district than in the southern. In addition, vitamin C intake was lower in the northern district. No clear evidence of a difference in milk consumption was noted. The decline in the incidence of gastric cancer observed during recent decades may be related to a reduced exposure on an increased part of the population to 3,4-benzypyrene such as is found in smoked and singed foods. A further study is required to ascertain whether the positive association revealed in this study between the incidence of gastric cancer and the levels of 3,4-benzopyrene found in common foodstuffs can be observed in other parts of Iceland.

11315 GASTROSCOPIC MANIFESTATIONS OF PANCREATIC TUMORS. (Pol.) Foremny, Z. (1st Intern. Dis. Clin., Katowice, Poland) and M. Machalski. Pol. Tyg. Lek. 22(34):1290-1292, 1967.

Among 1500 gastroscopies 45 abnormal findings were caused by pancreatic tumors (19 malignant, 25 inflammatory, 1 cyst). Signs of pressure and impressions in the stomach wall caused by pancreatic tumors can easily be recognized by means of gastroscopy. It allows exact evaluation of the condition of the gastric mucosa and facilita diagnostic exclusion of primary gastric neoplasm In 14 cases of inflammatory tumors and 4 cases arcinoma changes of the mucosa were discovered astroscopic examination which were not aled by radiology; in a few cases it showed sure and bulging of the stomach wall which not visible during radiological examinations. gnant tumors were frequently well-defined bulged into the gastric lumen as oval, well-neated structures while inflammatory tumors ed more extensive but less well-defined ing of the posterior wall of the stomach, r part of the fundus and the prepyloric seg-. The mucous membrane in cases of inflammatory rs is swollen and hyperemic with no erosions se usually result from neoplasms). It is luded that in all cases of suspected pan-tic carcinomas, cysts, or inflammatory tumors, roscopic examination should be performed.

6 EPIDEMIOLOGICAL ASPECTS OF CANCER OF THE STOMACH IN ISRAEL. (E.) Tulchinsky, Tel Hashomer Govt. Hosp., Israel) and B. n. Cancer 20(8):1311-1317, 1967.

are presented on the distribution of cancer he stomach in Israel for 1961-1963. The gnancies of 1172 Jewish and 33 Arabic patients diagnosed, yielding an incidence rate of /100,000 for males and 15.0 for females. youngest patient in the total group was 22 at diagnosis, and the oldest was 105 yr.; of patients, 1.2% were younger than 35 yr. and were 85 and older. Until age 35 there was eponderance of females with a male:female ratio of 0.4:1, in contrast to the overall o of 1.6:1. The incidence was significantly er in residents of European extraction with a pe:Africa age-adjusted ratio of 1.3:1 and a pe:Asia ratio of 1.8:1. In all population ps the incidence of the disease was signifi-ly higher in new immigrants compared to ran immigrants. A higher proportion of nite cases, diagnosed on a histopathologic s, relative to probable cases, diagnosed ically, was noted in males than in females; ological confirmation of cancer of the stomach significantly more prevalent among males 7%) than among females (54.5%). A higher ortion of definite cases relative to probable s was also observed in younger than in older groups and in immigrants coming from Europe in those coming from Asia and Africa.

7 SIALIC ACID IN THE GASTRIC JUICE OF THE PATIENTS WITH GASTRIC CANCER. (E.) , T., T. Nishida, H. Tamura, H. Inui and N. a. Ann. Rep. Ctr. Adult. Dis. (Osaka) 03-108, 1965.

g a combination of ion exchange resin matography and a very sensitive thiobarbituric assay, sialic acid was estimated in the ric juice from normal subjects and from ents with a variety of gastric lesions. The . of sialic acid (mg/100 ml) in 82 normal rols was 4.5 ± 0.26, while in 46 cases of gastritis it was 5.0 ± 0.28, 23 cases of atrophic gastritis, 5.9 ± 0.33, 98 cases of gastric ulcer, 4.6 ± 0.38, gastric polyp (5 cases), 4.3 ± 0.27, 52 cases of gastric cancer, 5.4 ± 0.86 and 14 cases of duodenal ulcer, 4.3 ± 0.24. In gastric cancer specimens, as well as in those with atrophic gastritis and histamine-fast achylia, there were increased levels of sialic acid, while in gastric ulcer and gastric polyp the levels were within the normal range. Of the various types of gastric cancer, Borrmann type III demonstrated an increased amount of sialic acid in the gastric juice; sialic acid values were within normal range in other types of gastric cancer. The adenomatous muconodular type of Borrmann type III contained a much greater amount of sialic acid than normal gastric mucosa; however, in the scirrhous type, sialic acid content was less than in normal gastric mucosa of resected stomachs.

11318 THE THICKNESS OF THE GASTRIC MUCOSA IN BIOPSY MATERIAL. (Ger.) Wolff, G. (Robert Rossle Clin., Berlin). Gastroenterologia (Basel) 107(4):235-241, 1967.

One stomach biopsy specimen was measured in 294 cases and 2 or more measured in 119 cases; the tissues were fixed, embedded under uniform conditions and measurements were made from the surface of the mucosa to the base of the gastric glands. Accuracy of measurements was tested by comparing values obtained from 1 histologic section with those from another section of the same person in 10 cases. The av. height of the mucosa proper (not including the muscularis mucosae) was 0.67 mm in 110 normal persons and 26 near normal (slight indication of infiltration). Those with any degree of gastritis (about 175 patients) had mucosae significantly thicker than normal (0.71-0.72 mm) whereas the approx. 102 with chronic gastritis including cases with partial and complete atrophy had an av. of 0.55 mm. The confusion in patient numbers arises from the omission of data on the numbers of patients with exact numbers of multiple biopsies.

11319 IN VITRO STUDIES ON ANTIBODIES TO INTRINSIC FACTOR. (E.) Schade, S. G. (U. Wisconsin Med. Sch., Madison), P. L. Feick, M. H. Imrie and R. F. Schilling. Clin. Exp. Immun. 2(4):399-413, 1967.

In vitro experiments on anti-intrinsic factor antibodies in the sera from patients with pernicious anemia were studied. Antibody I was found to be on a different molecule from antibody II, the latter uniting with either intrinsic factor or with intrinsic factor-B_{12}. Antibody I exchanges readily with the B_{12} of intrinsic factor-B_{12}. The complex intrinsic factor and antibody I will absorb Antibody II. These data support the conclusion that the intrinsic factor has at least 2 antigenic regions. An unusual type of antibody activity is also reported, one which seems to stabilize B_{12} on intrinsic factor so that exchange of $B_{12}{}^{59}Co$ or Antibody I with the $B_{12}{}^{57}Co$ of intrinsic factor-$B_{12}{}^{57}Co$ is inhibited. This antibody forms a complex with intrinsic factor-B_{12} as well, the latter being of a different size from other Antibody II-intrinsic factor-B_{12} complexes.

11320 MORPHOLOGY OF THE GASTRIC MUCOSA OF THE DOG AFTER IMMUNIZATION WITH AUTOLOGOUS GASTRIC JUICE. I. HISTOLOGICAL STUDY. (E.) Langr, F. (Charles U., Hradec Kralove, Czechoslovakia), B. Fixa, O. Komárková, J. Pařízek, O. Vejbora and I. Hradil. Path. Microbiol. (Basel) 30(4):419-424, 1967.

The immune mechanism of the delayed sensitivity kind is involved in the development of gastric atrophic changes. Four mongrel dogs of both sexes and of various ages were immunized with autologous lyophilized gastric juice with complete Freund's adjuvant. Histological inspection of the gastric mucosa showed marked edema of the interstitium, degenerative changes of parietal cells and infiltration of the interstitium by small cells. Specifically, changes in the parietal cells included anisochromy and a lowered staining of the plasma, vacuolization, karyorrhexis and pyknosis. It is remarkable that, in the period of max. atrophic changes, only a slight inflammatory reaction was found. Parietal and chief cells decreased in number.

11321 MORPHOLOGY OF THE GASTRIC MUCOSA OF THE DOG AFTER IMMUNIZATION WITH AUTOLOGOUS GASTRIC JUICE. II. HISTOCHEMICAL STUDY. (E.) Pařízek, J. (Charles U., Hradec Kralove, Czechoslovakia), B. Fixa, O. Komárková, F. Langr, I. Hradil and O. Vejbora. Path. Microbiol. (Basel) 30(4):425-432, 1967.

The distribution and activity of the enzymes in the normal gastric mucosa of 4 dogs after immunization with autologous lyophilized gastric juice was evaluated. During immunization significant changes in distribution and activity of certain hydrolytic enzymes occurred; marked changes were seen in the activity of acid phosphatase and nonspecific esterase. A mo. after antigen admin. the activity of acid phosphatase was high at the surface epithelium and in the glands, particularly in the parietal cells. Nonspecific esterase activity was depressed in surface epithelium. After several mo., atrophic changes developed and the activity of acid phosphatase increased to a marked degree in the neck cells. Activity of the dehydrogenases decreased in some parietal cells when atrophy occurred.

11322 AN IMPROVED G. I. CORD FOR THE DETECTION OF UPPER GASTROINTESTINAL BLEEDING. (E.) Bray, R. S. (Rhode Island Hosp., Providence). Amer. J. Proctol. 18(4):277-287, 1967.

To obviate those difficulties experienced in swallowing the original gastrointestinal cord ar to prevent discomfort caused by the excessively dry mouthpiece, modifications were studied. The new mouthpiece consists of a 2-ft. length of extruded rubber core without any metallic markers or outer cotton sheath. The distal rubber core is 2 ft. in length and is calibrate with metallic markers at 2-inch intervals and covered with an outer cotton sheath. The new-w apparatus is composed of bronze and is nickle-plated. It is drilled with 2 borings, 1 to permit passage of the cord itself and the other which fits tightly around the knotted tape at the end of the cord. Use of i.v. admin. of fluorescein dye is generally confined to those cases showing hematemesis, melena or deep positive-stained stools. The cord is extremely useful in the detection of these lesions of the upper gastrointestinal tract which manifest variable hemorrhage. Seventy ambulatory patients with sliding hiatal hernia (23), gastritis (5), peptic ulcer (35), prolapse of the antral folds (2), duodenal-jejunal diverticula (2) and esophageal varix (1) were evaluated wit the use of the new gastrointestinal cord. In slow bleeders, the blood stain appeared to be clotted and was of deeper color and greater intensity than that obtained from patients with more profuse hemorrhaging, thus a reduced test time was observed.

11323 GASTRIC ARTERIO-VENOUS SHUNTS. AN INVESTIGATION USING A DYE DILUTION TECHNIQUE. (E.) Bell, P. R. F. (Western Infir Glasgow, Scotland). Scand. J. Gastroent. 2(1): 59-67, 1967.

The function of gastric submucosal arteriovenou shunts was studied in 26 mongrel dogs by the inj. of a bolus of dye into the arterial side of the gastric circulation and its subsequent collection from the veins, so that a dilution curve was obtained of its passage across the gastric vascular bed; 0.6 mg indocyanine green in 0.5 ml distilled water at 37°C was inj. rapidly into the celiac axis after momentary occlusion of the vessel. Evidence of shunt activity was taken as a rapid transit time or double peak curves. The results suggest that under basal conditions evidence of functional arteriovenous shunts occurred in some animals; basal curves showed double peaks in only 2 dogs since basal curves of various types were obtain the effect of intermittent occlusion of the celiac axis, if any, was minimal. Histamine acid phosphate (infused at 1 µg/kg/min. or admin. s.c. at 1.0 mg) appeared to close shunts if they were open and divert blood through othe slower channels. Epinephrine (infused at 1 µg/kg/min., or admin. by repeated i.v. inj. of 0.25 ml of 1:10,000 soln.), vagal stimulatio vagotomy and hepatic anoxia (obtained by occlusion of the hepatic artery for periods of 5-10 min.) did not appear to have any effect on shunt activity. No evidence was found to suppo the view that shunts respond in a uniform manne to control mucosal blood flow.

24 RELATIONSHIP BETWEEN LESION PRODUCTION,
ABSORPTION, AND DISTRIBUTION OF C-
ELED ACETYLSALICYLIC ACID. (E.) Morris, E.
rdue U., Lafayette, Ind.), A. A. Noujalm,
S. Miya and J. E. Christian. J. Pharm. Sci.
7):896-899, 1967.

-Carboxyl-labeled acetylsalicylic acid was
pended in 5% polyvinylpyrrolidone and admin.
. to 24 male Holtzman rats in doses of 10-600
kg; control animals received similar doses of
yvinylpyrrolidone alone. The conc. of
tylsalicylic acid in the rumen and corpus
tions of the stomach and in other tissues was
ermined for various time intervals after admin.,
ng liquid scintillation counting and auto-
iography; the localization of the drug was
died in both the mucosal and muscularis sur-
es of the stomach. Acetylsalicylic acid in
es of from 50-600 mg/kg produced gastric
ions in the corpus portion of the rat stomach.
tylsalicylic acid was absorbed through the
osa of the corpus portion at a rapid rate,
n max. conc. being reached within 5 min. after
g admin. The conc. of the drug in the mucosa
the rumen portion remained relatively constant
r a 3-hr. period after admin., while the conc.
the corpus was initially high with a steady
rease beginning 5 min. after p.o. admin.;
drug conc. decreased in the corpus portion
a level comparable to that found in most
er tissues after approx. 1 hr., while in the
en it remained at a significantly higher
el. These findings tend to refute the hypoth-
s of focal necrosis, at least as the sole
hanism of gastric erosion. These findings
d to support the concepts of Davenport as to
importance of tissue permeability and ion
x across the mucosa in the production of
illary wall damage eventually resulting in
od loss and erosion of the mucosa.

5 A JEJUNAL POUCH AS SUBSTITUTE STOMACH
AFTER TOTAL GASTRECTOMY. AN EXPERI-
TAL STUDY IN RATS. (E.) Helsingen, N., Jr.
ate Hosp., Oslo) and K. Nygaard. Scand. J.
troent. 2(1):18-22, 1967.

ng adult male rats were subjected to 3 opera-
e procedures: 1) total gastrectomy, with a
x-en-Y reconstruction; 2) total gastrectomy,
x-en-Y reconstruction, with an additional
unal pouch; and 3) pylorectomy, with Roux-en-Y
onstruction. Unoperated rats served as con-
s. These groups of animals were compared
n regard to postoperative intake of food,
y wt., hemoglobin conc. and length of survival.
ood-sized jejunal pouch was present in all
nals at autopsy. After total gastrectomy,
re was no significant difference between the
toperative course in rats with and without a
unal pouch. However, rats with the fore-
mach intact showed a significantly greater
ake of food and body wt., and survived longer
n totally gastrectomized rats; therefore,
s "ideal food pouch" seemed to demonstrate
the importance of a food reservoir in the rat. The normal controls survived longer than any of the other groups, probably demonstrating the importance of the secretory function of the stomach.

11326 EXPERIENCE ON GASTRECTOMY WITH ANTEROCOLONIC GASTRO-ENTEROANASTOMOSIS WITHOUT ENTERO-ENTEROANASTOMOSIS. (Rus.) Frumgarts, A. N. (Cent. Inst. Postgrad. Med., Moscow). Vestn. Khir. Grekov 98(6):23-27, 1967.

During 1956-1965 gastrectomy (Billroth II) with the anterocolonic gastroentero-anastomosis but without entero-enteroanastomosis was performed on 255 patients; 203 of them had ulcer diseases of the duodenum or of the stomach, 47 stomach cancer, and 5 gastric polyposis. Up to the end of 1962 anastomosis was applied on 10-12 cm-long ansa (144 operations), later on 25-30 cm-long ansa. In the case of ulcer disease an av. of 66% of the stomach was removed whereas with cancer almost the whole stomach was removed. After surgery 2 patients died (bleeding into the abdominal cavity; peritonitis). Dysfunction of the anastomosis (regurgitation, retching), lasting up to 3 days, occured in 21 patients; these could be removed by gastric lavage. Prolonged (4-10 days) regurgitations, occurring in 4 patients, could be eliminated by the same treatment. Two patients had adhesive obstruction which had to be removed by surgery. All patients with evacuation difficulties were cured. Further complications occurring and being treated after surgery were: bleeding into the gastrointestinal tract (8 patients), pneumonia (1), abscess of the abdominal cavity (2), suppuration of the wound (1), and thrombophlebitis of the lower extremity (1). Complications involving the cardiovascular system were not observed, although 93 patients were more than 40 yr. old. Complications involving the liver or the pancreas were absent. Blood and gastric juice analyses, X-ray examination of the gastrointestinal tract, and other tests were observed in 166 patients for 1-10 yr. Dumping syndromes of various intensity occurred in 30 patients and disappeared in 27 of them after appropriate diet. In 7 patients gastritis was detected, 2 had colitis, and 7 hepatitis or hepatocholecystitis. Recurrence of ulcer disease were not observed. Former activities could be resumed in 92% of all patients.

11327 pH AND CONCENTRATION OF PANCREATIC ENZYMES IN ASPIRATES FROM THE HUMAN DUODENUM DURING DIGESTION OF A STANDARD MEAL. IN PATIENTS WITH DUODENAL ULCER AND IN PATIENTS SUBJECTED TO DIFFERENT GASTRIC RESECTIONS. (E.) Worning, H. (Blegdam Hosp., Aalborg, Denmark), S. Müllertz, E. H. Thaysen and H. O. Bang. Scand. J. Gastroent. 2(1):23-38, 1967.

After ingestion of a standard meal, the intestinal contents were collected from each of 166 patients during 4 subsequent periods of 20 min. each; the vol., pH and the conc. of α-amylase, trypsin, chymotrypsin and lipase in the collections were determined. The 166 patients included 39 with duodenal ulcer, 113 with partial gastrectomy, which included 20 with a Billroth I gastrectomy and 93 with a Billroth II gastrectomy, 5 with a gastroenterostomy and 9 with total gastrectomy. The pH was not below normal in patients with duodenal ulcer. The results indicate an admixture of salivary to pancreatic amylase in the intestine of patients with gastrojejunostomy, particularly by concomitant hypoacidity. In all groups of patients, secretions of trypsin, chymotrypsin were closely related. In patients with partial or total gastrectomy, the secretion of lipase was more markedly reduced than the secretion of other enzymes. The mean conc. of lipase in the efferent loop in Billroth II patients was closely related to the absorption of fat. Depending upon the enzyme concerned, 10-20% of the patients with duodenal ulcer, and 21-50% of the patients subjected to Billroth II gastrectomy, had abnormally low conc. of enzymes in all collections. In these groups of patients, the mean conc. of the 4 enzymes was significantly reduced in all collections. In patients exposed to Billroth I gastrectomy, gastroenterostomy, or total gastrectomy, mean mean conc. of the enzymes were below normal levels in the first collection only.

11328 ALCOHOLISM OF SUBJECTS WITH GASTRIC RESECTION.

(Hun.) Péntek, L. (Regional Hospital, Eger, Hungary) and Z. Gáldi. Orv. Hetil. 108(11):503-504, 1967.

Before gastrectomy for previous ulcerous disease, only 13 of the 294 patients studied consumed alcohol regularly. After surgery the number of regular consumers (mainly of wine) increased to 132. The proportion of patients who reported digestive difficulties after resection was the same for the alcohol consumers and nonconsumers (9.1 and 9.0%). A marked relationship was found between the acidity of the gastric juice of the patients before the gastrectomy and the incidence of alcoholism after surgery. Among persons with hyperacidity, normal acidity, and hypoacidity, 54.7, 27.3, and 6.1%, resp., became regular alcohol consumers. A parallel investigation showed that 32 of 701 chronic alcoholics had undergone gastrectomy. It is emphasized that consumption of wine or other alcoholic beverages by persons after gastrectomy is not recommended.

11329 VAGOTOMY OF THE STOMACH. A TOPOGRAPHIC-ANATOMIC PROBLEM.

(Ger.) Kothe, W. (Ernst Moritz Arndt U., Greifswald, Germany) and A. Dorn. Zbl. Chir. 92(28):2163-2167, 1967.

Vagal innervation of the stomach was traced in 20 male cadavers (3-82 yr. old). A vagal plexus, was found about the thoracic esophagus and was supplied by both left and right vagi with massive mixing of the left and right fibers. On the lower thoracic esophagus just above the hiatus, the fibers of the plexus formed a trunk or a number of nerve trunks on the left anterior wall of the esophagus; from these arose 2 main nerves, 1 a right vagus and the other an anterior vagus (in 17 of 30 cases there was only 1 anterior trunk, in 11 2 nerve tracts were noted and in the remaining 2, 3 or 4 branches were present). The branching of the single anterior vagus trunk began somewhat above the cardia with 1 or more branches turning toward the left to the anterior wall of the fundus. The trunk itself turned toward the liver to which a number of fine branches passed. From the convexity of the trunk a number of branches passed alone the anterior edge of the lesser curvature to disappea in the anterior wall of the stomach. The terminal branching could be followed as far as the incisura. In 5 of 17 cases with a single anterior trunk a direct connection with the celiac ganglion could be demonstrated and in 9 of the 17 cases a connection with the lower stomach branches of the right vagus could be shown. When there were multiple nerves, the 1 to the right or those on the right sent long nerves to the liver and along the lesser curvature; in some cases nerves from the right branches entered the celiac ganglion and the lower branches of the right vagus trunk proper. When the multiple anterior nerves anastomosed with each other (7 of 13 cases) the gastric regions and the liver were supplied by nerves from the anastomosis. Branches radiating toward the left entered the fundus, turning caudad as far as the anterior wall of the stomach. In 15 cases the anterior trunk or trunks had connections with the celiac plexus and in 15 other cases with the right vagus trunk; 7 showed connections with both the ganglion and the right vagus trunk. The right vagus trunk was more regular than the anterior one. Below the hiatus a number of branches supplied the posterio wall of the cardia and the fundus. The right trunk was completely separated from the esophagus sending a thick nerve to the celiac ganglion; usually a smaller branch passed to the left becoming associated with the left gastric artery. A branch of this upon leaving the artery, entered the lesser curvature of the stomach and passed to the posterior region of the stomach. The branching nerves often form anastomoses.

11330 GASTRIC SURGERY IN ALBINO RATS. RESEARCH ON METHODS.

(Ger.) Maurer, W. (U. Polyclin. Erlangen, Germany). Z. Gastroen 5(3):183-188, 1967.

Technics in stomach operations were studied in 125 rats (180-250 g) fasted for 12 hr. prior to surgery and maintained in cages with screen flooring to prevent coprophagy. Animals with empty stomachs at the time of operation showed significantly fewer postoperative complications. Beginning on the day after operation each animal received 1.5 ml 3 times/day of a cocktail with the composition: 250 ml 5% glucose soln., 10 mg SP 366 (a spasmolytic), and 250 mg of oxytetracycline (Terramycin). SP 366 reduced pancreatic etion. The cocktails were continued for 7 ; water and food were available to the animals nning on the second day after surgery. Loss lood during surgery was prevented as the loss .5 ml represented 5% of the total blood vol.; gastrointestinal tract of the rat is cially subject to trauma. Ligature thread silk no. 4-0 and 5-0 used with a traumatic eal needles with the lightest needle holders the weakest pincers. All tissue layers were erly sutured for continuity. Operations in ral involved end-to-end anastomoses of the ach, duodenum and jejunum, and side-to-side tomoses. The vascularization of the stomach proximal small intestine is described and strated with special reference to the arteries. ial operative methods which are described in il include gastric resection according to roth I, according to Billroth II, and gas- resection with atypical anastomoses of the intestine; these were chiefly of the anti- staltic type (34 cases). The overall death in these surgical studies was 25%.

1 A COMPARATIVE ASSESSMENT OF OPTICAL AND FIBRE GASTROSCOPES. (E.) Kont, L. A. elbourne, Australia) and G. Berci. Med. Illus. 17(3):181-190, 1967.

rison by several photographic tests of 3 of gastroscopes, Schindler gastroscope flexible with a lens system), Hirschowitz gastroscope and the Eder fiber gastroscope, ated that the flexible fiber endoscope has in definite advantages but that further vements will be necessary before it can be dently recommended as being superior in all cts to standard instruments based on lens ms. With the Schindler, definition (image ness) was excellent; geometrical and optical duction good, and light transmission, fair; the Hirschowitz instrument, light trans- on, geometrical and optical reproduction excellent, resolution were good and ition was fair. With the Eder instrument, ution and geometrical reproduction was lent and optical reproduction, definition ight transmission were good. The total ter of the actual image seen through the r was 46 for the Schindler, 45 for the Eder 6 for the Hirschowitz and the magnification :1.5, 2:1 and 1:1.1, resp. The viewing (object distance 40 mm, lateral view) was 31° and 44°, resp.

CHANGES OF CATECHOLAMINE LEVEL IN GASTRIC WALL TISSUE IN REFLEX DIGESTIVE RBANCES. (E.) Zavodskaia, I. S. (Inst. Med., Leningrad, USSR) and E. V. Moreva. Pharmacol. Exp. (Basel) 16(5):399-402,

phic injuries were induced in male albino ed rats by combined immobilization and . of electrical current (rectangular impulses of alternating current, 6-7 volts) for 3 hr.; starved intact rats served as controls. After treatment, gastric wall tissue was removed and examined for catecholamine content. After admin. of electrical current to immobilized rats for 3 hr. there was a quantitative decrease of catecholamines in the gastric wall; this was particularly noted for norepinephrine. The level of norepinephrine in intact animals was 0.64/0.24 µg/g of wt. of damp tissue, while after strenuous irritation it diminished to 0.21/0.16 µg/g in 6 experiments and disappeared completely in 5 cases. Changes in epinephrine content in the gastric tissue were not as marked. It is concluded that excessive irritation, provoking development of destructive reflex impairment in the gastric wall, is accompanied by a decrease of the catecholamine level. Alterations in the balance of catecholamines may be regarded as 1 of the possible causes which elicit dystrophic processes in the gastric wall. These results are indicative of the important role played by the sympathetic nervous system in the development of neurogenous gastric wall dystrophies.

11333 FUNDIC RESECTION IN RATS AND ITS LONG TERM EFFECT ON DEVELOPMENT OF GASTRIC CANCER. (E.) Ackerman, N. B. (U. Hosp., Boston, Mass.). Gastroenterology 53(2):280-287, 1967.

Sprague-Dawley rats which were made hydrochloric acid-deficient by resection of the fundus of the stomach and anastomosis of the antrum to the rumen appeared to be more susceptible to the effects of the carcinogen methylcholanthrene or a chronic irritant HCl than were animals with intact stomachs, although they did not develop gastric malignancies after resection alone. In a group of 19 rats with fundic resection and which received 0.02 N HCl as the source of drinking water, 2 gastric cancers were identified; one was a squamous cell carcinoma and the other an adenocarcinoma of the stomach which penetrated to the serosa. In this group 6 had ulcerations. In a group of 23 animals which had fundic resections plus methylcholanthrene pellets (av., 7.0 mg) implanted in the antrum, gastric cancers also developed in 2 rats. Both tumors originated in the antrum; one was a fibrosarcoma involving all layers of the stomach and the other an adenocarcinoma that penetrated through to the serosal surface. Gastric ulceration was present in 4 of this group. Rats which received only pellet implants did not develop tumors although some superficial gastric ulceration was present in 7. Bone formation in the mucosa occurred in 17 rats from 3 groups (fundic resection, fundic resection plus acid, resection plus pellets).

11334 THE NORMAL GASTRIC AND DUODENAL RUGAE. RADIOGRAPHIC FINDINGS IN NON-DYSPEPTIC YOUNG PERSONS. (E.) Krag, E. (Aarhus Hosp., Denmark). Acta Med. Scand. 182(1):1-4, 1967.

The morphology of the gastric mucosa was studied radiographically in 94 (79 males, 15 females) healthy, nondyspeptic medical students who were 20-30 yr. old; the morphology of the duodenal mucosa was also studied in 59 of these subjects. In all subjects the fundus revealed slightly irregular mucosal folds; in the body and prepyloric region the course of the folds was largely regular and parallel to the curvatures. The width of the folds was less than 5 mm in all subjects but 1, in whom films taken in the dorsal position showed folds of a width of up to 7 mm, but the pattern was also regular. All of the subjects studied showed a normal duodenal bulb without signs of deformity or irritability; the folds of the bulb were regular and the remaining portion of the duodenum revealed the characteristic feather-boa pattern, except in 2 cases in which the duodenum was rather hypotonic, but with a regular mucosal pattern; all folds observed were less than 5 mm in width. It is concluded that in nondyspeptic subjects in the 20-30 yr. old age group, the gastric and duodenal mucosae show a regular mucosal pattern with nonrigid folds which are less than 5 mm in width.

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) Tomat, E. (Civil Hosp., Udine, Italy).
ali *Med*. 22(2):305-324, 1967.

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See also abstract nos.: 10922,10939,10967,11012,11056,11063,11064,11280,11456,11519,11743,11931

11397 A TECHNIQUE FOR CONTROLLED SAMPLING OF SMALL INTESTINAL CONTENTS. (E.)

Wiggins, H. S. (Cent. Middlesex Hosp., London), H. Bramwell Cook and G. M. McLeod. T. Gastroent. 10(1):64-76, 1967.

A new translucent polyvinyl tube for collecting small intestinal contents and which permits quick positioning in the small intestine and a rapid delivery of the sample to the collecting chamber is described. The tube features only 1 aspiration hole; a distal Hg bag and a large leader balloon which is inflated by a fine vinyl tube cemented to the exterior of the main aspiration tube and an inner balloon controller which is fitted into the main aspiration tube at the site of the aspiration hole. To permit fluoroscopic visualization, the last 10 cm of the main tube are filled with a radio-opaque powder and this is complemented by a radio-opaque stripe on the distal end of the main tube. Each patient was evaluated after an overnight fast. Two collections were generally made on each patient, 1 around the duodenojejunal flexure and the other from the distal jejunum. The first collection is followed by inflation of the terminal balloon and repositioning of the tube for the second collection which is made on the following day. In normal subjects, a total of 28 samples of small intestinal contents were obtained with a total study time ranging from 120-345 min. Total sample wt. in this group ranged from 4-159 g with a sampling wt. rate of 8-202 g/hr. In addition, samples were obtained from patients with mucosal malabsorption (3 patients), pancreatic malabsorption (2), after ileal resection (1) and after gastrectomy (1).

11398 THE PROPHYLACTIC USE OF AN "ELEMENTAL" DIET IN EXPERIMENTAL HEMORRHAGIC SHOCK AND INTESTINAL ISCHEMIA. (E.)

Bounous, G. (McGill-Montreal Gen. Hosp. U. Surg. Clin., Canada), G. Sutherland, A. H. McArdle and F. N. Gurd. Ann. Surg. 166(3):312-343, 1967.

Diffuse necrosis of the intestinal epithelium is confirmed as a primary lesion in hemorrhagic shock; a similar necrosis induced by short-term clamping of the mesenteric arteries is associated with the development of lesions in kidneys, heart and other organs similar to those observed after hemorrhagic shock. The very function of digestion of normal food seems to create in the intestinal mucosa a condition of relative intolerance to ischemia. Both hemorrhagic shock and mesenteric arterial occlusion were induced in a series of dogs. One group was fed a control diet consisting of one 15-ounce can/day of a standard commercial dog food; an elemental ration was prepared to be precisely equivalent in composition and quantity to the control, not only in protein equivalent, fat and carbohydrate, but also in vitamins and minerals; the elemental diet was blended from the following ingredients: aminosol, 500 ml; sucrose, 20 g; lipomul, 20 ml; NaCl, 1.7 g; $KHCO_3$, 1.0 g; vitamins, 5 g; and $CaCl_2$.2 2 g; this diet corresponded to the following values, expressed as g/day (500 ml), with the source of each moiety shown in brackets: prote 25 (aminosol); carbohydrate, 25 (aminosol); carb hydrate, 20 (sucrose); fat, 13.7 (lipomul), Na, 0.1,(aminosol); Na, 0.674 (NaCl); K, 0.33 (amin sol) K, 0.47 ($KHCO_3$); Cl, 1.0 (NaCl); and Ca, 0 ($CaCl_2 \cdot 2\ H_2O$). Feeding of this elemental diet before injury reduced the intracellular digesti burden of the intestinal epithelium, while main taining absorption and nutrition. Some signifi changes occurred in the metabolism of the epithelial cells. A 3-day period on the diet led an increased rate of incorporation of labeled adenine into the ATP of the mucosa. After shoc this rate of incorporation fell proportionally both groups of animals, but the resultant rate the mucosa of dogs on the elemental diet mainta a level 5-fold that reached by dogs on normal f It is concluded that a period of 3 days on the elemental diet not only reduced the intralumina toxic factors, but also appeared to enhance the metabolic state of the intestinal mucosa, makin it more tolerant to ischemia. In proportion to the degree of mucosal integrity, whether morpho logic or metabolic, survival was improved and the extraintestinal lesions were virtually elim ated.

11399 NEW LONG INTESTINAL TUBE FOR RAPID NONOPERATIVE INTUBATION. A PRELIMINA REPORT. (E.)

Edlich, R. F. (U. Minnesota, Minneapolis), E. Gedgaudas, A. S. Leonard and O. H. Wangensteen. Arch. Surg. (Chicago) 95(3) 443-450, 1967.

A new tube for rapid nonoperative intubation is described in which an air-controlled flexible directional tip has been incorporated into the long coiled-spring tube; addition of this flexi tip has facilitated rapid pyloric and jejunal intubation under fluoroscopic visualization, ev in the presence of marked intestinal distention Over a 3-yr. period, 48% of intubations with th long coiled spring intestinal tube were unsuccessful because the tip remained coiled in the stomach; jejunal intubation was achieved in les than 30 min. in 15 of 29 cases. Addition of th controllable tip to the end of the tube enabled pyloric and jejunal intubation to be achieved within 30 min in 29 of 31 patients with intestinal obstruction; 25 of 29 patients successfully intubated were rapidly decompressed by th long tube in less than 48 hr. Successful decompression was not always associated with reli of obstruction. All 5 patients with paralytic ileus had obstructions relent without surgical intervention, compared to only 2 of 18 patients with carcinomatosis. Development of this techn for rapid jejunal intubation had allowed approx 40% more patients with intestinal obstruction t gain the benefits of rapid nonoperative decompr sion.

0 ANGIOGRAPHY IN EXPERIMENTAL STRANGULATING
OBSTRUCTION OF THE SMALL INTESTINE IN
. (E.) Aakhus, T. (Ulleval Hosp., Oslo).
Radiol. [Diagn.] (Stockholm) 6(4):337-347,
.

rel dogs were divided into 4 groups and
ected to the following procedures, using an
0 cm long intestinal loop close to the trans-
n of the lower quarter of the small intestine:
ntestinal strangulating obstruction, 4 dogs;
egmental venous ligature, 3 dogs; 3) ligature
he superior mesenteric vein, 1 dog; and 4)
rol operation (no ligature applied), 1 dog.
ctive superior mesenteric angiography, using
rial exposure technic, was performed pre-
atively and at intervals during the post-
ative period. After the first procedure,
gs had increasing arterial obstruction at
level of the ligature, and in 2 of these,
nation of the contrast medium was noted in
arteries immediately proximal to the point
ompression; blood flow was distinctly reduced
he strangulated area, and this flow reduction
lted in a delayed and prolonged outlining of
arteries, a poor filling of finer arterial
ches and only a slight parenchymatous contrast
ity in the strangulated loop. Arterial flow
the affected area was reduced in all 3 ex-
ments on segmental venous ligature; a char-
ristic delayed and prolonged outlining of
arteries, as well as poor filling of the finer
ches and reduced parenchymatous density in the
cted loop, were clearly demonstrated. Pro-
sive generalized narrowing of the entire sup-
mesenteric artery and its intestinal branches
red in later stages in dogs subjected to the
2 procedures. After ligature of the superior
teric vein, a slight arterial flow reduction
bserved in the corresponding region at 30
postoperatively; no changes from the pre-
tive angiography, apart from derangement of
rteries after manipulation of the intestine,
observed in later stages of this experiment,
fter the control operation. A rapid decrease
stemic blood pressure followed the second
dure, and a slower fall was noted after the
procedure; after the third procedure, there
ome reduction in blood pressure at 8 hr. and
finite fall in pressure occurred after the
ol operation. It is suggested that selective
ior mesenteric angiography may be of diag-
c value in human patients with possible
tinal strangulating obstruction.

INTESTINAL OBSTRUCTION AND SIMILAR
CONDITIONS IN EARLY CHILDHOOD. (Ger.)
, A. (Postgrad. Med. Inst., Prague).
chr. Roentgenstr. 99:1-72, 1967.

osis of the various forms of ileus, based
re than 300 cases of mechanical and functional
uction in the very young, is presented with
y every type of complete or partial ob-
tion included. Obstruction was more fre-
in females than males; the incidence of
mechanical obstruction was greater than the functional in the first 6 days of life; from the second wk. through the fifteenth mo. functional ileus was much more frequent; from the third through the sixth mo. of age no case of mechanical obstruction occurred in over 300 patients. Beginning with the eighteenth mo., frequency of mechanical and functional ileus was the same. The indications provided by contrast medium must be considered with caution. The p.o. admin. of contrast material is strongly contraindicated for all cases of high obstruction; gastric emptying is delayed in complete and partial intestinal obstruction for periods sometimes in excess of 24 hr., thus reducing the usefulness of the contrast material. The position of the contrast material is taken as the X-ray sign of obstruction; this is a specific indication in some diseased states only, e.g., meconium ileus and aganglionosis. Intestinal stenosis can be located by radiologic examination using contrast medium. A fully air-free intestine occurs only when the newborn has not swallowed any air, in stillbirths, and in instances of esophageal atresia. Vomiting, dehydration and severe pneumopathies can cause shrinkage of the air vol.; however, a gas-free intestine never results. During complete or partial obstruction, indications of stasis occur: the normal gas bubbles increase in size; square bubbles form and enlarge into a continuous air-space in the small or large intestine. It is advisable to identify gas in the rectum, sigmoid, and descending colon; this aids in differentiation of the intestinal regions, it also indicates that the obstruction is of recent origin. The presence of gas must be established as being in the small or large intestine; when located in the small intestine, the possibility of mechanical obstruction exists. If the gas is in the large intestine, and the previous evacuation was normal, then a functional type of ileus must be considered. Oral intubation for the introduction of air was seldom used; the best method was the use of a drink such as tea and milk; with 30 ml of fluid 60-70 ml of air was swallowed; with no local hindrance the air was rapidly passed into the small intestine. Air proved to be better than unphysiologic contrast material. When necessary air could be introduced rectally to differentiate the large and small intestine.

11402 RESULTS OF TREATMENT OF INTESTINAL
OBSTRUCTION IN THE NEWBORN AND CHILDREN.
(Ger.) Joppich, I. (U. Clin. Heidelberg, Germany)
and W. C. Hecker. Chirurg 38(7):293-295, 1967.

Intestinal obstruction of widely divergent etiologies such as tumor, atresia, ascariasis, and hernia, was treated surgically in 452 cases with a mortality of 11.8%; 76 were newborn (mortality 28.9%), 296 were from 4 wk. to 4 yr. old (mortality 6.8%), and 80 were from 4-15 yr. old (mortality 13.5%). Hernia was the greatest single cause of intestinal obstruction with 232 cases (51.3%). The high mortality in early infancy was attributed to associated abnormalities, faulty development, prematurity and peritonitis. Of 14 premature infants 5 died but 5 of 14 fullterm newborns also died; all of the latter had peritonitis. In late infancy and childhood mortality was mainly due to inadequate fluid and electrolyte replacement; H_2O and salt deficit may have been severe enough to cause circulatory stasis; a 4-yr.-old patient received a fluid vol. of 4400 ml in 24 hr. (25% of the vol. in the first 3 hr.) in order to stabilize the circulation and to compensate for the H_2O and salt deficiency. Adequate fluid and electrolyte balance resulted in a decrease in mortality from 17% to 1% for children from 4 wk. to 15 yr. old.

11403 DIGESTIVE TRACT OCCLUSION AS A POSTOPERATIVE COMPLICATION IN THE GYNECOLOGICAL AND OBSTETRIC PRACTICE. (Pol.) Higier, J. (2nd Cent. Hosp. Clin., Warsaw). Wiad. Lek. 19(23):1855-1860, 1966.

In 2725 gynecological laparotomies performed between 1946-1963 there were 18 cases of severe postoperative ileus requiring relaparotomy. Ten of the occlusions were due to adhesion of loops of the small intestine, 2 were pure paralytic occlusions (ileus), 2 mechanical occlusions of the large intestine and the remainder were due to intestinal suppuration or peritonitis. Early postoperative ileus was most often seen after cesarean section (8 of 18 cases). There were 2 cases after extrauterine pregnancy, 3 after myoma, 2 after inflammation of the appendages, and 4 after correction of the uterine position. Appendectomy performed during gynecological laparotomy did not cause an increase in these complications. Between 1946-1954 the number of postoperative occlusions amounted to 1.9% of all gynecological laparotomies (11 of 586) while between 1955-1963 there was a reduction to 0.3% (7 of 2139). This reduction was due mainly to improved surgical technics, avoidance of trauma to the intestine with tampons, and so on (by the use of appropriate anesthesia which calms the abdominal cavity), careful peritonealization, and postoperative electrolyte adjustment.

11404 PNEUMATOSIS CYSTOIDES INTESTINALIS IN INFANTS. (Pol.) Grygielowa, S. (Korczaka Hosp., Lodz, Poland) and Z. Tomczyk. Przegl. Lek. 23(4):392-394, 1967.

Analysis of postmortem examinations performed between 1958 and 1964 on 308 children whose deaths were caused by severe diarrhea revealed 9 cases of pneumatosis cystoides intestinalis (2.9% of cases). All were young infants; most were less than 3 mo. old, the oldest being 7 mo. When hospitalized they were in poor general condition, underweight, with severe diarrhea, often marasmic, and with pneumonia and otitis. The cysts were most often found in the large intestine but in 1 case they were present in the small intestine also. It seems that a certain period of time has to elapse before the characteristic changes occur
(approx. 1 mo. after onset of the symptoms) bec
in the infants who died only a few days after t
onset of diarrhea, pneumatosis cystoides intestinalis was not discovered. A certain periodic
of the disease was noted: in 1958 there were 4
cases observed, 1 case in 1959, 1961 and 1963,
2 cases in 1964. It is concluded that this con-
dition is not as rare as it seems to be from th
literature and that because of the absence of a
characteristic clinical picture, an in vivo
diagnosis is extremely difficult.

11405 EXPERIMENTAL INVESTIGATIONS ON POSSI-
BILITIES OF IMPROVEMENT OF THE INTEST
RESORPTION AFTER EXTENSIVE RESECTION OF THE SMA
INTESTINE IN DOGS BY MEANS OF REVERSED, INTESTI
SEGMENTS. (Pol.) Sadowdki, J. (2nd Surg. Clin
Warsaw). Pol. Przegl. Chir. 38(10):1073-1077,
1966.

To study the effect of inserting a reverse peri
staltic segment, after massive resection of the
small intestine, on body wt. and absorption of
fat, protein and carbohydrates, 10 dogs were
divided into 2 groups. In the first group 66%-
75% of the proximal part of the small intestine
was resected; this caused loose stools, diarrhe
a wt. loss of 22-31% and a 7-15% decrease of fa
absorption depending upon the diet. Protein
absorption decreased 4% with standard and 21%
with high-fat diet. After 2-3 mo. a reverse
intestinal insertion was applied and 4-5 mo. la
the initial wt. was regained or surpassed, H_2O
content of stools and absorption of fat and pro
tein returned to normal. In the second group o
dogs the distal part of the small intestine was
resected and the reverse peristaltic insertion
applied simultaneously. These dogs regained th
initial body wt. in 4 wk. and the absorption of
fats and protein and H_2O content of stools was
the same before and after the operation. There
were no complications after the insertion of th
reversed segment and radiology revealed no distention of the gastrointestinal tract. There
no difference seen when the proximal or distal
part of the small intestine was resected.

11406 ALLERGIC DISEASES OF THE SMALL INTEST
(Ger.) Fahrländer, H. (U. Basel,
Switzerland). Wien. Klin. Wschr. 79(35):644-6
1967.

11407 EXPERIENCES WITH INTESTINAL SHORT
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Wills, C. E., Jr. J. Med. Ass. Georgia 56(9):
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11408 THERAPY OF FUNCTIONAL PROBLEMS OF TH
INTESTINE. (Fr.) Colloques Romands
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P. Secretain, Eds., Basel, Karger, 1966, 65pp.

11409 ULTRASTRUCTURE OF INTESTINAL MUCOSA
THE NORMAL RAT AND EXPERIMENTAL

UTRITION. (Sp.) Gonzalez-Angulo, J. (Nat. Ctr., Mexico City), A. Gonzalez-Angulo and . Elias. Bol. Inst. Estud. Med. Biol. (Mex.) -2-3):71-85, 1966.

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3 INTESTINAL ANGINA. DIAGNOSIS AND TREATMENT. (E.)(Rev.) Neschis, M. tefiore Hosp., New York, N. Y.) and J. G. er. Geriatrics 22(9):127-134, 1967.

HISTOLOGICAL STUDIES OF TRANSPLANTED FREE JEJUNAL GRAFT; ESPECIALLY DEGENERA- OF GANGLIONIC NERVE CELLS. (Jap.) Daido, R. uru Nat. Hosp., Kyoto, Japan), M. Kano, K. ani, Y. Nishio and M. Funada. Iryo 21(5): 96, 1967.

HYDROLYTIC ENZYME ACTIVITY IN RAT SMALL INTESTINE AFTER WHOLE-BODY IRRADIATION. Wrigglesworth, J. M. (U. Birmingham, England) . F. R. Pover. Int. J. Radiat. Biol. 12(3): 50, 1967.

INTESTINAL OBSTRUCTION AND ITS' TREATMENT. (Rus.) Shchekotov, G. M. Moscow, sina, 1966, 393pp., $1.60.

DUODENAL STENOSES OF VASCULAR ORIGIN. (It.) Fazio, A. (U. Padua, Italy) and tronio. Chir. Pat. Sper. 14(1-3):10-30, 1966.

INTESTINAL STENOSES OF ISCHEMIC ORIGIN. (Fr.) Stoebner, P., E. Philippe, M. -Bousson, M. Gillet and A. Suhler. Ann. Path. (Paris) 12(2):165-175, 1967.

LOCAL TREATMENT OF EXTERNAL DUODENAL FISTULAS BY CONTINUOUS IRRIGATION WITH C ACID. (Sp.) Martinez Rodriguez, E. Med. (Barc.) 49(2):113-115, 1967.

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11423 MESENTERIUM COMMUNAE AND CONGENITAL ANOMALIES OF INTESTINAL ROTATION IN ADULTS: REPORT OF FOUR CASES. (Jap.) Nakayama, M. (Showa U., Japan), H. Suzuki, Y. Tanaka, H. Hayshi, T. Ueno and T. Yagami. Showa Igakkai Zasshi (J. Showa Med. Ass.) 27(5):445-457, 1967.

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11425 STUDIES OF INTESTINAL MICROFLORA. VI. EFFECT OF X-IRRADIATION ON THE FECAL MICROFLORA OF THE RAT. (E.) Klainer, A. S. (New England Med. Ctr. Hosp., Boston, Mass.), S. Gorbach and L. Weinstein. J. Bact. 94(2): 378-382, 1967.

11426 STUDIES OF INTESTINAL MICROFLORA. VII. EFFECT OF DIET AND FECAL MICROBIAL FLORA ON SURVIVAL OF ANIMALS EXPOSED TO X-IRRADIATION. (E.) Klainer, A. S. (New England Med. Ctr. Hosp., Boston, Mass.), S. Gorbach and L. Weinstein. J. Bact. 94(2):383-387, 1967.

11427 PATHOLOGY OF MECKEL'S DIVERTICULUM. (Rus.) Lebedev, A. P. (Belorussian Inst. Postgrad. Med., Minsk, USSR). Klin. Med. (Moskva) 45(8):124-126, 1967.

11428 DISCUSSION OF 23 CASES OF MECKEL'S DIVERTICULUM IN THE INFANT AND CHILD. (Fr.) Beau, A., J. Prévôt, P. Collignon and M. Guillaumot. Ann. Med. Nancy 6:724-727, 1967.

11429 VASCULAR PATHOLOGY OF THE INTESTINES. (It.) Stocchi, F. (Inst. Holy Spirit, Rome) and V. Ruotolo. Policlinico [Prat.] 74(36):1213-1239, 1967.

11430 WATER SOLUBLE CONTRAST MEDIUM USED AS AN AID IN THE THERAPEUTIC DIAGNOSIS OF INTESTINAL OBSTRUCTION. (E.) Kao, M. C. (Nat. Taiwan U., Taipei), K. M. Chen and S. C. Hsu. Int. Surg. 48(4):376-384, 1967.

11431 VOLVULUS OF THE SMALL INTESTINE AFTER HERNIORRHAPHY. (E.) Renton, C. J. C. (Nottingham Gen. Hosp., England) and N. H. Vellani. Brit. Med. J. 3(5567):719-720, 1967.

11432 DUODENOGRAPHY IN ARTIFICIAL HYPOTENSION FOR THE DETECTION OF DUODENAL DIVERTICULUM. (Rus.) Babiets, A. P. (Pirogov Vinnitsa Reg. Hosp., USSR) and O. S. Tsymbaliuk. Klin. Med. (Moskva) 45(8):103-104, 1967.

11433 EFFECT OF AN INHIBITOR OF TRYPSIN AND KALLIKREIN ON THE BEHAVIOR OF PANCREATIC ENZYMES IN THE SERUM OF PATIENTS WITH ILEUS. (Pol.) Krynicki, M. (Military Hosp., Kielce, Poland). Pol. Tyg. Lek. 22(38):1442-1444, 1967.

11434 CLINICAL VALUE OF BIOPSY BY THE ORAL ROUTE OF THE SMALL INTESTINE. (Sp.) Rios Mozo, M. (Fac. Med., Seville, Spain). Rev Esp. Enferm. Apar. Dig. 26(6):712-732, 1967.

11435 A CONTRIBUTION TO THE CLINICAL COURSE OF DUODENAL DUPLICATION: CASE REPORT AND LITERATURE REVIEW. (Ger.) Schüler, H. W. (U. Clin., Heidelberg, Germany) and B. Schüler. Z. Kinderheilk. 100(4):291-306, 1967.

11436 TUMORS OF THE INTESTINES. (E.) Wood, D. A. Washington, Armed Forces Institute of Pathology, 1967, 261 pp.

11437 INTESTINAL COMPLICATIONS OF AMEBIASI (Rus.) Emirov, N. A. (Dagestan Med. Inst., Makhachkala, USSR). Med. Parazit. (Mos 36(4):405-409, 1967.

11438 THE ROLE OF LAMBLIA IN THE PATHOLOGY OF INTESTINAL DISEASES IN CHILDREN. (Rus.) Gubergrits, M. V. (Martsinov Inst. Parasit. & Trop. Med., Moscow) and E. L. Varla Med. Parazit. (Moskva) 36(4):410-413, 1967.

See also abstract nos.: 10921,10922,10936,10937,10953,11012,11075

ERRATUM: GAC 2(8): Abstract No. 6666, 1967, the last sentence should read:
In all studies, the 24-hr. urine ---------

39 TREATMENT OF PERFORATED PYLORIC ULCER BY A MODIFICATION OF THE NEUMANN NET

F. (Ger.) Smolinski, E. (U. Clin., Rostock,
many). Zbl. Chir. 91(48):1799-1801, 1966.

2 yr., 12 patients (8 of them elderly) were gically treated for perforated pyloric ulcer hout mortality using a Kehr T-drain to carry gastric secretion into the duodenum without hing the ulcer, and using a modified net cuff ised by Neumann. The location of the perforated mach lesion (usually on the anterior pyloric l) and the general condition (often including nosis of the pylorus) predicated palliative gery. The T-drain was used with the longer (4-5 cm) placed so that it extended into duodenum and the shorter arm into prepyloric ion of the stomach. The third arm was passed ough the perforation of the ulcer and fastened a waterproof closure using tied sutures or a se-string suture; the net around the third , anchored in the stomach wall, and fastened he parietal wall of the abdomen, secured the rain in an opening of the body wall; this wed drainage of the stomach and also the ly of liquid, nutrients and electrolytes to patient. The removal of the drain and the cuff presented no difficulties 4 mo. later gastric resection. After recovery from the t operation and prior to the second the ent was ambulatory, the tube in the body wall ng been clamped off.

40 RESIDUAL GASTRIC CONTENTS AFTER VAGOTOMY, GASTRECTOMY AND SUTURE OF PERFORATED IC ULCER.

(Pol.) Tołłoczko, T. (First Surg.
., Acad. Med., Warsaw, Poland) and M. Szostek.
Przegl. Chir. 38(12):1436-1439, 1966.

residual gastric content was measured for 3 in 105 patients who underwent the following s of surgery: 30 gastrectomies with subhragmatic vagotomy for duodenal ulcer, 30 rectomies without vagotomy for duodenal ulcer, astrectomies for gastric ulcer and 15 sutures erforated duodenal ulcer. In all cases of rectomy and gastrectomy with vagotomy the values of residual gastric contents were est on the second postoperative day. In ents with suture of perforated duodenal ulcer e was a slightly gradual, but statistically gnificant, increase of residual contents for 3-day period. Vagotomy had no influence on amount of residual gastric content.

1 MANOMETRIC STUDY OF THE EFFECT OF VAGOTOMY ON THE GASTROESOPHAGEAL NCTER.

(E.) Crispin, J. S. (Winnipeg Gen.
., Manitoba, Canada) and J. F. Lind. Canad.
urg. 10(3):299-303, 1967.

effect of therapeutic transabdominal vagotomy ne functional integrity of the gastroesophageal sphincter both at rest and during abdominal compression in 10 patients (28-75 yr.) with chronic, intractable peptic ulcer and without demonstrable esophageal disease or hiatal hernia is described. Motility studies were carried out from 1 wk. to 1 yr. after truncal vagotomy (9 pyloroplasties and 1 gastrojejunostomy) and the results were compared with preoperative results. Postoperatively, no patient demonstrated any sign of hiatal hernia and the length and relationship of the sphincter to the level of the diaphragm, mean max. sphincteric pressure, and the stomach-to-sphincter gradient did not change significantly from the preoperative values. Postoperative results associated with abdominal compression showed a sphincter pressure which was significantly reduced (from 15.5 to 5.8); this, in turn, yielded a significantly reduced stomach-to-sphincter gradient also (from 20.1 to 7.1). Pressure increase in the stomach postoperatively approx. that observed preoperatively. Intraesophageal pressure gradients remained essentially unchanged postoperatively. The reduction in sphincteric pressure postoperatively may be the result of transsection of the afferent limb of the vagal reflex arc during vagotomy.

11442 BOWEL HABIT AFTER GASTRIC SURGERY.

(E.) Nelson, P. G. (Roy. Melbourne Hosp.,
Australia). Med. J. Aust. 1(25):1242-1245, 1967.

By direct personal interview a comparable blind study with statistical analysis was made comparing the bowel habit of patients after 4 standard operations for duodenal ulcer. A total of 205 patients were interviewed between 1-6 yr. after operation; 49 had a standard Polya resection, 46 had vagotomy and antrectomy, 61 pyloroplasty and vagotomy and 49 had vagotomy and gastroenterostomy. Aberrations of bowel habit were seen in 25-35% of patients after vagotomy, but severe disability was not common. The associated gastric operation had no effect on the incidence of bowel aberration after vagotomy. A statistically lower, but appreciable, incidence of aberrations followed gastrectomy. There is no ready explanation for the less satisfactory postoperative bowel habit after vagotomy. Little clinical or experimental support is found for the hypothesis that selective vagotomy rather than total section confers significant improvements in bowel habit. The case for selective vagotomy in operations for duodenal ulcer may rest not on the improvement in postoperative bowel habit, but on other, less well-studied, extragastric effects of total vagal section.

11443 GASTRIC OR DUODENAL ULCER IN PATIENTS WITH COEXISTENT ATHEROSCLEROSIS.

(Pol.) Hirnlowa, L. (3rd Intern. Dis. Clin., Wroclaw,
Poland), K. Janicka and M. Dyczkowska. Pol. Tyg.
Lek. 22(12):435-437, 1967.

Coexistence with atherosclerosis was observed in 40 of 260 cases of gastric and duodenal ulcers. A detailed clinical, biochemical and radiological comparison was made of these 50-80-yr.-old patients (Group 1) with forty 25-53-yr.-old patients without coexistent atherosclerosis (Group 2). Gastric or duodenal ulcer was of shorter duration among patients with atherosclerosis (no more than 7 yr. duration) than in the control group (up to 25 yr.). In 26 patients of Group 1 there was bleeding from the digestive tract (as compared to 14 in the control group) occurring more frequently and without warning symptoms. In this same group there was a lack of the periodic and seasonal aggravation of symptoms, pain was not connected with the time of eating and no pain occurred during the night and when fasting. There was normal or decreased acidity of gastric contents (moderate hyperacidity, free HCl 40%-60%, was noticed only in 14 patients as compared to 27 in the control group). Roentgenologic examinations revealed 18 gastric and 17 duodenal ulcers in Group 1, while Group 2 had 9 gastric and 25 duodenal ulcers. Group 1 responded much more slowly to therapy with alleviation of the symptoms 4-16 wk. after initiation of treatment, while Group 2 showed improvement in 2-3 wk. It is concluded that all these differences may indicate a different etiology of peptic ulcers in these 2 groups.

11444 CARBOHYDRATE METABOLISM IN DUODENAL ULCER PATIENTS. (E.)

Buchanan, K. D. (Roy. Infirm., Glasgow, Scotland), M. T. McKiddie, A. C. Lindsay and W. G. Manderson. Gut 8(4):325-331, 1967.

Since abnormalities of carbohydrate metabolism have been reported to occur in association with peptic ulceration, p.o. and i.v. glucose tolerance tests were performed in 14 patients (all men; 15-38 yr. old; all had radiological evidence of duodenal ulceration without delayed gastric emptying; none were more than 10% above ideal body wt., and several were under weight) with duodenal ulceration and in 14 control subjects (all men; 20-31 yr. old; all were within 10% of ideal body wt. and none had a family history of diabetes mellitus). Plasma insulin levels were measured by immunoassay. Blood sugar levels after p.o. glucose were similar in the 2 groups, but plasma insulin levels were significantly higher in ulcer patients. The i.v. glucose tolerance tests produced almost identical blood sugar and plasma insulin levels in both groups. In duodenal ulcer patients, no correlation was found between the insulin response to p.o. glucose and the gastric secretion after an augmented histamine test.

11445 A THERAPEUTIC TEST FOR DIFFERENTIAL DIAGNOSIS BETWEEN GASTRIC ULCER AND ULCER MALIGNANT DEGENERATION. (Rus.)

Simbirtseva, L. P. (Inst. Oncol., Leningrad, USSR) and M. L. Gershanovich. Vop. Onkol. 13(3):24-29, 1967.

In 25 patients (14 males, 11 females; age 32-70
yr.) with gastric ulcers of benign or malignant
nature the use of 4-methyluracil (up to 3 g/day
in 3-6 admin.; total up to 100 g; p.o.) for a
therapeutic test in differential diagnosis coul
be helpful. Of 16 patients with diagnosis of
benign gastric ulcers (on first X-ray examinati
4-methyluracil treatment in 13 resulted in the
disappearance of X-ray symptoms of niche and
inflammatory changes with no recurrence 6-14 mo
later, in 1, the niche remained unchanged and i
flammatory symptoms regressed and the ulcer la
healed. In 1, the niche disappeared but gastri
wall infiltration remained; however, surgery
showed benign leiomyoma of the prepyloric part;
in 1, treatment was not accompanied with roentg
logic improvement and surgery verified diagnosi
of malignant degeneration of gastric ulcer. I
4 of 7 patients with possible malignant degene
tion of ulcer, treatment resulted in disappeara
of the niche and the benign nature of the ulce
was established subsequently during prolonged
observation. In 1, despite positive test resu
possible malignant degeneration was not elimin
however, surgery showed a healed ulcer. In 2
persons 4-methyluracil did not induce ulcer he
and surgery revealed a malignant process (mali
degeneration of the ulcer and low-differentiat
carcinoma in situ with superficial erosion).
2 patients with diagnosis of the ulcerative fo
of gastric cancer, therapy caused no disappear
of the niche and surgery revealed the ulcerati
form of adenocarcinoma and malignant degenerat
of the gastric ulcer. The therapeutic effect
4-methyluracil in peptic ulcer is also stresse

11446 DEVELOPMENT OF PEPTIC ULCER IN WORKE
EXPOSED TO CARBON DISULFIDE. (Pol.)

Andruszcak, K. (Wročlaw Inst. Synthetic Fibers
Poland). Med. Pracy 17(6):555-560, 1966.

A greater incidence of ulcers was found among
workers exposed to CS_2 in a viscose-producing
factory than among nonexposed employees. The
study included 1453 men and 905 women between
18-65 yr. old and extended over a 4-yr. perio
Among the 524 men and 64 women who were const
exposed to the action of CS_2 there were 53 ca
(9%), (49 of the 524 men, 9.3% and 4 of the 6
women, 6.2%) who suffered from ulcers (28 duo
16 gastric and 9 of changing location). Of 9
men and 841 women in the control group there
52 cases (2.9%) of ulcer patients (36 men, 3.
and 16 women, 1.9%). The difference between
2 groups was statistically valid. The diseas
most often observed in those 28-38 yr.old and
most evident during the first 5 yr. of exposu
to CS_2. It seemed to be more severe and show
greater tendency to recur among the exposed g
It is concluded that many factors play a role
the pathogenesis of peptic ulcer among worke
exposed to the action of CS_2, some of which a
changes in the CNS, circulatory system, and t
adrenals.

47 A STUDY OF PSYCHOLOGICAL FACTORS IN PATIENTS WITH SURGICALLY INTRACTABLE DENAL ULCER AND THOSE WITH OTHER INTRACTABLE ORDERS. (E.) Thoroughman, J. C. (VA Hosp., anta, Ga.), G. R. Pascal, J. R. Jarvis and C. Crutcher. Psychosom. Med. 29(3):273-278, 7.

s study shows that the psychological measures ch had been used, with an excellent predictive idity in a previous study, to separate poor gical results from good surgical results in ients with intractable duodenal ulcers were specific to such a condition, but occur with er intractable illnesses. When 20 patients n intractable duodenal ulcers who gave poor gical results were matched with 20 patients n other intractable disorders such as chronic back pain, rheumatoid arthritis etc., and n were subjected to the Deprivation Scale lysis no particular item differentiated the roups. Studies of the early parental behavior ing the patient's first 10 yr. again did not ferentiate the 2 groups. Furthermore, these roups could not be separated on complaints ut ingestion, sleep and motility. These data gest that patients who have had environmental overishment and poor early relationships with ents belong to a much larger population of avioral deviants rather than a population with pecific physiological propensity.

48 SC-15396: A NEW ANTIULCER COMPOUND POSSESSING ANTI-GASTRIN ACTIVITY. (E.) k, D. L. (G. D. Searle & Co., Chicago, Ill.) R. G. Bianchi. Life Sci. 6(13):1381-1387, 7.

i.v. admin. of 2-phenyl-2-(2-pyridyl)-thio- camide (2-10 mg), a nonanticholinergic, anti- er compound, to rats during gastric perfusion duced a reversible inhibition of gastrin (0.1- μg) stimulation. In mongrel dogs with chronic tric fistulas or dogs with gastric pouches, n innervated (Pavlov) and denervated (Heiden- n), gastric secretion was stimulated with tamine diphosphate (0.05 mg/kg, admin. s.c.), C-terminal gastrin tetrapeptide (100 μg, admin. .) and food (25 g of canned salmon). The anti- er compound was admin. p.o. in doses of 10, or 50 mg/kg at 30 min. before the gastric mulant. The antiulcer compound produced a ked inhibition of gastrin tetrapeptide-stimulated retion, but inhibition of gastric secretion mulated by food was equivocal and histamine mulation was not significantly affected. It concluded that this new nonanticholinergic, iulcer compound is a specific inhibitor of trin-induced gastric secretion.

49 EFFECT OF CHLORDIAZEPOXIDE ON STOMACH ULCERS IN RABBIT INDUCED BY STRESS.) Dasgupta, S. R. (Calcutta U., India) and P. Mukherjee. Nature (London) 215(5106):1183, 7.

Male rabbits were subjected to emotional stress in the form of electroshock daily for 21 days; 3 rabbits received daily i.p. inj. of chlordiazepoxide (50 mg/kg) 30 min. before electroshock, and controls received electroshock alone. Stomachs from controls all showed extensive congestion, numerous hemorrhages, shedding of epithelium over large areas and distinct ulceration; among those that received chlordiazepoxide there was slight shedding of epithelium in 1 animal, and some congestion in all of them, but no ulceration and no hemorrhage. It seems that premedication with chlordiazepoxide affords protection against the effects on stomach of emotional stress. If it is assumed that stomach lesions after emotional stress are due to adrenocortical hormone released in response to increased conc. of ACTH in the blood, it can be inferred (on the basis of the results described herein) that the antagonism between chlordiazepoxide and ACTH prevents the release of adrenocortical hormones in amounts sufficient to damage the stomach.

11450 DEGRADED AND UNDEGRADED CARRAGEENANS AND EXPERIMENTAL GASTRIC AND DUODENAL ULCERATION. (E.) Anderson, W. (U. Strathclyde, Glasgow) and P. D. Soman. J. Pharm. Pharmacol. 19(8):520-526, 1967.

The prevention of histamine-induced gastric and duodenal ulceration in the guinea pig was examined using a series of undegraded and degraded carrageenans. Histamine acid phosphate (10 mg/kg), suspended in a beeswax-arachis oil (10:90) base (1 mg/ml), was admin. i.m. to intact fasted guinea pigs. This treatment consistently produced duodenal ulceration at the end of 24 hr.; carrageenan was admin. in drinking water in a total dose of 115-2400 mg. Gastric ulceration was produced in the pylorus-ligated guinea pig; saline (1 ml) alone (control) or containing half the dose of carrageenan in soln. was inj. intraduodenally 30 min. before, and repeated immediately after, inj. of histamine acid phosphate (5 mg/kg, s.c. in saline, 1 ml/kg). Total dose of carrageenan, admin. intraduodenally, ranged from 20-400 mg. Undegraded carrageenans were active at lower doses than degraded carrageenans; the high viscosity of the undegraded carrageenans in soln. prevented their use in larger doses. Degradation of carrageenan without serious loss of sulfate, gives a product which allows the dose to be increased to a degree that its effect more than offsets the slight loss in activity caused by the degradation. No single feature of carrageenan structure could be related to anti-ulcer activity, although degradation, and hence reduction of molecular size, generally reduced activity. Sulfate contents over 30% had little apparent effect on activity; κ-carrageenans were not consistently different in anti-ulcer activity from λ-carrageenans. This contrasted with the antipeptic activity of carrageenans, where κ-carrageenans were less active than their λ-counterparts. As with antipeptic activity, the degree of anti-ulcer activity was probably determined by a combination of structural features which included molecular size and polyanionic properties.

11451 ON THE PROBLEM OF GASTRIC ULCER FORMATION BY GLUCOCORTICOIDS IN RATS AND THE EFFECT OF ANDROGENIC-ANABOLIC STEROID ON THEM. (E.) Linèt, O. (Res. Inst. Natural Drugs, Prague) and J. Mikulášková. Endokrinologie 51(3-4):224-233, 1967.

A 4-day regimen of either prednisolone or its acetate (5 mg/day/rat increased to 15/mg/day/rat) in fasting rats resulted in only hemorrhages of the gastric mucosa. In further studies, after admin. of hydrocortisone acetate (10 mg/day/rat), a series of mucosal alterations resulted. Most common were the punctiform hemorrhages which represented either a superficial mucosal necrosis with both grossly dilated vessels and hemorrhage at the base of the lesion or a superficial mucosal lesion with a pronounced WBC line of delineation at the base of the lesion along with gross edema of the submucosa. Lesions greater than 1.5 by 1.5 mm showed mucosal defects extending to varying depths. The most severe grade observed consisted of hemorrhagic necrosis of the whole gastric wall along with concomitant thrombosis of the gastric blood vessels. Simultaneous admin. of hydrocortisone and androgenic-anabolic drugs (19-nortestosterone phenylpropionate, methandienone and dimethylandrostanolone) resulted in an apparent increase in the number of macroscopically visible lesions. Dimethylandrostanolone decreased the number of hemorrhages, however. Combined drug admin. also failed to reverse the marked wt. loss associated with hydrocortisone alone.

11452 GASTRIC ULCERATION IN TUMOR-BEARING RATS. (E.) Baillie, P. (NCI, Bethesda, Md.), F. K. Millar, S. D. Morrison and A. W. Pratt. J. Nat. Cancer Inst. 38(6):939-946, 1967.

Adult, male Sprague-Dawley albino rats, in which the Walker carcinosarcoma 256 (1 of 2 lines) was transplanted, were fed ad libitum 1 of several diets (diluted evaporated milk, chow, dried tumor base, casein base), or were fed a restricted amount of the casein diet; these rats were then examined for gastric ulceration. Normal (nontumor-bearing) rats were fed ad libitum or were partially or totally deprived of food. In tumor-bearing rats fed ad libitum, ulcers developed in both the forestomach and in the glandular area of the stomach 21 or more days after tumor transplant with all diets fed, except chow. Ulcer incidence increased with age of the tumor, but there was great variability. In tumor-bearing rats partially deprived of food and killed 18 days after transplant, the ulcer incidence was significantly lower than in rats with spontaneous comparable intake killed 28 days after transplant. In normal rats totally deprived of food, the incidence of forestomach ulcers increased with the period of deprivation (3-7 days); glandular ulcers developed only after more than 6 days of deprivation. Fro the relation of ulcer incidence to tumor wt., food intake, adrenal wt., and carcass wt. change it appeared that gastric ulceration in the tumor bearer required a degree of food deficit, such a occurs with progressive tumor growth, in conjunction with some minimal stage of tumor developmen No definitive cause for ulceration was found.

11453 CELL PROLIFERATION DURING THE DEVELOPM OF STRESS EROSIONS IN MOUSE STOMACH. (E.) Kim, Y. S. (Cornell U. Med. Coll., New York, N. Y.), R. Kerr and M. Lipkin. Nature (London) 215(5106):1180-1181, 1967.

The number of cells incorporating tritiated thym dine (25 µc/mouse, specific activity 6.7 c/mmole and entering into mitosis in the stomach of the (male CFW) mouse during prolonged stress (restraint), before and during the development of erosions was measured. Histological examination of the gastric mucosa revealed scattered focal areas containing moderate vacuolization of cytoplasm in epithelial cells and slight-to-moderate decrease in periodic acid-Schiff-positive mucopolysaccharide; desquamation of surface cells wa increased, and in a few areas early collapse of the mucosa was noted, the cells having abnormal eosinophilic cytoplasm with pyknotic nuclei; there was no edema, necrosis or inflammatory exudate. Eleven of 13 animals that had been unc stress had reduced mitoses compared with control and 12 of 13 had reductions in labeled cells. The frequencies of mitoses and labeled cells were significantly decreased in the stress group these decreases were in areas of mucosa containi no histological alterations mentioned earlier; despite cell damage and loss, therefore, during the development of erosions the rate of replacement of epithelial cells was significantly lower than that of the nonstressed controls. Tritiate L-leucine-4,5 (specific activity 5 c/mmole, 100 µc/mouse) was also inj. i.p. into 2 additior groups of stressed and control animals maintaine under the same conditions, and the animals were also sacrificed 1 hr. after inj.; comparative rates of protein synthesis in intestinal epithel cells were estimated. The results showed active incorporation of leucine into all cell types. Throughout the mucosa, epithelial cells showing histological abnormalities were well-labeled wit leucine, as observed after early radiation damag

11454 EMOTIONAL REACTIVITY AND SUSCEPTIBILIT TO GASTRIC EROSIONS. (E.) Ader, R. (U. Rochester Sch. Med. Dent., N. Y.). Psychol. Rep. 20(3):1188-1190, 1967.

Data from experiments using Charles River rats or rats from a genetically heterogeneous background were re-analyzed; the animals were depriv of food and water for 18 hr. before a 6-hr. peri of immobilization in flexible wire mesh; at leas 2 wk. prior to immobilization, all animals were observed in an open-field and/or a reaction-to-handling test. No evidence for a relationship

tween emotional reactivity and susceptibility
gastric erosions was found. In only 1 instance
s there a significant behavioral difference
tween animals that did and did not develop
osions. Further analysis of the quantitative
asures of behavior yielded by the open-field
ich might have uncovered a curvilinear associa-
on between these behaviors and susceptibility to
osion also did not indicate any relationship.
ese results suggest that the differences observed
another investigator were a concomitant of the
lective breeding and that the behavioral measures
rported to reflect "emotionality" were not gen-
ally related to the subsequent development of
stric erosions.

55 BEHAVIORAL AND PHYSIOLOGICAL RHYTHMS
AND THE DEVELOPMENT OF GASTRIC EROSIONS
THE RAT. (E.) Ader, R. (U. Rochester Sch.
., N. Y.). Psychosom. Med. 29(4):345-353, 1967.

s subjected to a 6-hr. period of immobilization
e more susceptible to the development of gas-
c erosions if the immobilization was imposed
ing the peak rather than the trough of the
mals' 24-hr. activity rhythm. The incidence
erosion was increased in both groups when the
mals were deprived of food 24-hr. prior to
immobilization. Furthermore, in experiments
ng rats housed under a 12-hr. light-dark sched-
, a 24-hr. rhythm in plasma pepsinogen level
noted which synchronized with the 24-hr.
ivity cycle. However, the range of pepsinogen
ues during a 24-hr. period did not exceed 20%
the overall mean so that the difference in
sinogen levels were not sufficient, in them-
ves, to account for the observed differences
susceptibility to gastric erosions. Plasma
ticosterone levels also showed a 24-hr. rhythm
it did not correlate with the activity. More-
r, no relationship was found between plasma
ticosterone levels and the presence of erosions
lowing 6-hr. immobilization.

56 EXPERIMENTAL STUDY OF GASTRIC INTOLERANCE
OF COATED MICROGRAINS OF ASPIRIN. (Fr.)
nat, P. (47 quai de la Tournelle, Paris), P.
ter, J. Fontagné and B. Flouvat. Therapie
2):403-410, 1967.

tric tolerance to aspirin and microencapsulated
irin in rats (180-280 g) was studied by 3
cedures. 1) Ordinary aspirin and coated (with
yl cellulose) aspirin in aqueous gum suspensions
e admin. by esophageal intubation to groups
rats in doses of 250 mg/day, 5 days/wk. for
k. At the end of the experimental period some
s were autopsied and others were kept under
ervation for 3 wk. prior to autopsy. 2) The
mals were fasted for 4 days during which they
eived 25, 50, or 100 mg/kg/day of aspirin or
ted aspirin by esophageal intubation; on the
rth day, 5 hr. after the last dosage, the
mals were autopsied. 3) Animals treated accord-
to the second procedure received 50 mg/kg/day; on the fourth day tissue from each stomach was fixed for general histology, in acetone for histochemical demonstration of hydrolases, and in a mixture of acetone and dry ice for hydrolytic and oxidation-reduction enzymes. The degree of ulceration following the first procedure was only about 50% as great with coated aspirin as with the ordinary type. The second procedure showed a reduction of ulceration of about 33% due to microencapsulation. The degree of ulceration increased with increasing dosages of aspirin. The histological effects included venous and capillary congestion, regional dedifferentiation of some epithelial and infundibular cells, punctiform ulcerations frequently covered with a mucofibrinous layer with entangled cellular debris, and larger ulcerations that did not reach the submucosa. Histochemical studies showed a definite inhibition of mucus secretion. The serum levels of aspirin were the same for both types of aspirin when admin. in the same dosages to animals of the same wt.

11457 ENDOGENIC HISTAMINE AND EXPERIMENTAL GASTRIC ULCERS IN THE RAT. (Fr.) Schwartz, J. C. (Fac. Pharm., Paris), R. Boulu and G. Valette. C.R. Soc. Biol. (Paris) 161(1):50-53, 1967.

The action of histamine on the formation of gastric ulcers provoked by constraint, phenylbutazone (100 mg/kg, i.p.), or reserpine (100 mg/kg or 8 mg/kg, i.p.), was studied in 285 white rats (100-140 g). Histamine action was tested with the prior treatment of either 13-20 mg/kg s.c. of aminoguanidine, an inhibitor of diaminoxidase, reducing the degradation of histamine, or 300 mg/kg i.p. of bromo-4-hydroxy-3-benzyloxamine, a specific inhibitor of decarboxylase, blocking the synthesis of histamine. The differences in ulcer incidence between the experimental and control animals (inj. with saline only) were not significant, indicating that ulceration was not modified by a reduction in destruction of histamine in vivo, or by a decrease in the biologic production of the amine.

11458 THE INFLUENCE OF LOCAL DISORDERS OF BLOOD CIRCULATION ON THE DEVELOPMENT OF ULCERS IN THE SMALL INTESTINE IN RATS. (Pol.) Ławinski, M. (Inst. Path. Anat., Wroclaw, Poland) and J. Szacki. Pat. Pol. 18(1):103-110, 1967.

A total of 76 male Wistar rats of 200-250 g wt. and divided into 2 groups were used to determine the effect of the inj. of 0.2 ml of conc. NaCl soln. into the mesentery of the small intestine. Of the first group, 20 rats received 0.2 ml of the following soln.: 15 ml 0.9% NaCl, 4.5 g NaCl, and 3 g of wheat starch (to slow absorption of NaCl). Six rats received the same soln. but with no starch and 20 were used as controls. The second group comprising 30 rats received the same inj. of conc. NaCl but a constriction of the mesenteric vein was induced causing hyperemia of the intestinal wall. In 14 of these animals excessive constriction of the mesenteric vein caused death due to hemorrhagic enteritis within 3 days after the operation. The surviving rats were sacrificed on days 3, 8, 14, and 21 after the inj. and segments of the intestine were examined macro- and microscopically. Ulceration occurred in 50% of the animals of both experimental groups surviving 8-14 days. Hyperemia, induced by constriction of mesenteric vein, had no effect on the frequency of ulcers. Other pathological changes (adhesions, thickening of the mucous membranes and cicatrization of the mesentery) were seen in 27% of rats of the first group and peritoneal adhesions in 13.3% of the second group. Histological examination of the ulcerated tissue showed that they were identical to human ulcers of the small intestine. Since the inj. of conc. NaCl soln. into the mesentery caused local disturbances in blood circulation, it was concluded that such disturbances in the mesentery and intestinal walls in humans may give rise to ulcers.

11459 POSTBULBAR DUODENAL ULCER. (Cz.) Novák, A. (Fac. Med., Brno, Czechoslovakia), J. Vitek and F. Vrubel. Cesk. Radiol. 21(4):229-237, 1967.

11460 THE LIVER IN GASTRIC OR DUODENAL ULCER PATIENTS. (Por.) Moisão, R. (Fac. Med., Lisbon). J. Soc. Cienc. Med. Lisboa 131(6-7):465-475, 1967.

11461 PREULCER. OUR CONCEPT OF GASTRIC AND DUODENAL ULCER. (Sp.) Nasio, J. Med. Rev. Mex. 47(1017):368-372, 1967.

11462 STATISTICAL CLINICAL STUDY ON GASTRODUODENAL ULCER DISEASE IN THE SENILE. (Sp.) Meeroff, M. (Araoz Alfaro Polyclin., Lanus, Argentina). Med. Rev. Mex. 47(1016):326-333, 1967.

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11508 CLINICO-PHYSIOLOGICAL CHARACTERISTICS OF THERAPEUTIC ACTION OF FUBROMEGAN IN GASTRODUODENAL ULCER. (Rus.) Trusov, V. V. (Izhevsk Med. Inst., USSR). Ter. Arkh. 39(8): 65-68, 1967.

See also abstract nos.: 11011,11012,11023,11048,11049,11051

)9 ULCERATIVE COLITIS AND CROHN'S DISEASE. (Nor.) Gjone, E. (State Hosp., Oslo) Norsk. Laegeforen. 87(9b):908-911, 1967.

erative colitis had an incidence (in three ·. periods beginning with 1946) of 8.6, 15.1 20.6 cases/yr./million population; this in-ase appears to be due to better diagnostic ns. The incidence among men and women is ·ly the same. Except in childhood and persons ve the age of 70 when susceptibility is less, incidence is fairly uniform. The total number cases of regional enteritis was 73 in the period 5-63. In the period 1956-1960, there were 362 es of ulcerative colitis with an incidence of 5 million/yr. For the same period there were cases of regional enteritis with an incidence 2.2 million/yr. This means 1 case of regional eritis is diagnosed for every 9.3 cases of erative colitis.

10 PROGNOSIS AFTER RESECTION OF CHRONIC REGIONAL ILEITIS. (E.) Lennard-Jones, E. (Cent. Middlesex Hosp., London) and G. A. lder. Gut 8(4):332-336, 1967.

ee definitions of recurrence (symptomatic urrence, symptomatic relapse with radiological 'or surgical evidence of recurrent disease, further resection for regional ileitis) e used to calculate by an actuarial method the urrence rate after resection for chronic re-nal ileitis in a series of 78 patients from ospitals. In every patient, the disease af-ted primarily the terminal ileum; the adjacent on was affected in 30, in 3 there was a skip on higher in the ileum and in 4 patients the noid colon was involved by serosal adhesion. low-up was complete in 73 of 78 patients. The imated probabilities in this series showed : after a first resection for regional ileitis, urrent symptoms were likely in approx. 33% the patients within 5 yr. and in slightly more n 50% within 10 yr.; recurrent symptoms with iological and/or surgical evidence of recur-t disease were likely in approx. 25% at 5 yr. approx. 50% at 10 yr. Approx. 17% of the ients could be expected to require further ection within 5 yr. and 25% within 10 yr. The imated mortality rate from regional enteritis er the first resection was 7% at 5 yr. and 12% 10 yr. In a small series of 15 patients the urrence rate after a second resection was more n twice as great as after a first resection. se definitions of recurrence and this method analysis are suggested as a possible basis for ure analyses so that the results of treatment different groups of patients may be compared.

11 REGIONAL ENTERITIS OF THE COLON. DISTINCTIVE FEATURES OF THE ENTITY. (E.) <, W. A. (Cleveland Clin. Found., Ohio), R. B. nbull, Jr. and R. G. Farmer. J.A.M.A. 201(10): -746, 1967.

Of approx. 1500 cases of primary ulcerative disease of the colon seen over a 15-yr. period, approx. half were classified as regional enteritis of the colon. This disorder is grossly characterized by serpiginous or longitudinal furrow ulcers or both, segmentally or diffusely arranged with areas of normal-appearing mucosa separating the ulcers. Microscopically, the inflammation is transmural. Noncaseating, sarcoid granulomas may be found, but are absent in 33% of the cases. Deep fissures, which may extend through the intestinal wall, may be observed in 25%-30% of the cases and appear to be the basis for fistula formation. Postcolectomy ileitis occurs much more commonly in patients with regional enteritis of the colon than in those with chronic ulcerative colitis; the incidence is approx. equal in patients with or without ileitis at the time of first colectomy. Of 151 cases studied in detail, 87 were regional enteritis of the colon (48 granulomatous, 39 nongranulomatous), 48 were chronic ulcerative colitis and 16 were unclassified. The ranges of age distribution of patients having regional enteritis of the colon and chronic ulcerative colitis were 9-75 yr. and 9-70 yr., resp.; a slightly higher percentage of patients with chronic ulcerative colitis (25%) were more than 50 yr. of age as compared to the patients with regional enteritis of the colon (10%). Of 87 with regional enteritis of the colon, 42 had involvement of the terminal portion of the ileum at the time of colectomy, compared to only 5 of 48 with chronic ulcerative colitis. Of those with regional enteritis of the colon, the rectum was normal in 40% as compared with 9% of those with chronic ulcerative colitis. There was no carcinoma arising in the intestine among those with regional enteritis of the colon; this contrasted with 6 (12.5%) of 48 with chronic ulcerative colitis who developed carcinoma. There were 18 deaths in the 151 cases; 10 were in the chronic ulcerative colitis group and 7 in the group with regional enteritis of the colon. Toxic dilatation of the colon occurred in 13 of 48 patients with chronic ulcerative colitis, and in 12 of 87 patients with regional enteritis of the colon. Pyoderma gangrenosum and arthritis were noted occasionally in association with both regional enteritis of the colon and chronic ulcerative colitis, but most often with the latter. After colectomy, there was a 92% cure in those with regional enteritis of the colon and an 80% cure in those with chronic ulcerative colitis. Of the 16 cases of unclassified colitis, 6 patients probably had some form of regional enteritis of the colon and 1 patient probably had chronic ulcerative colitis; the other 9 patients did not show sufficient specific changes for definitive diagnosis.

11512 PSYCHIATRIC ASPECTS OF REGIONAL ENTERITIS. (E.) Parfitt, H. L. (U. Hosp., Edmonton, Alberta, Canada). Canad. Med. Ass. J. 97(13):807-811, 1967.

See also abstract no.: 11542

11513 COMPARISON OF VENOUS AND CAPILLARY BLOOD SAMPLES IN LACTOSE TOLERANCE TESTING. (E.) McGill, D. B. (Mayo Clin., Rochester, Minn.) and A. D. Newcomer. Gastroenterology 53(3):371-374, 1967.

Lactose tolerance tests were performed on 22 normal subjects (13 men, 9 women; all Caucasian; 21-57 yr. old, with a mean age of 33 yr.), and on 10 patients (6 men, 4 women; 25-58 yr. old, with a mean age of 38 yr.) with lactase deficiency (less than 0.5 U of lactase/g of wet wt. of jejunal mucosa); blood for glucose analysis was drawn simultaneously from a vein in the arm and a finger tip of the opposite extremity. The mean peak increase of glucose in capillary blood in 21 of 22 normal subjects was 44.2 mg (20-99 mg/100 ml), while in venous blood it was 30.8 mg (7-62 mg/100 ml). The 4 subjects who had a peak increase of less than 20 mg% glucose in venous blood and thus had flat curves, had normal curves for capillary blood. In lactase-deficient patients, 8 of 10 capillary peaks were greater than the venous peaks. Three lactase-deficient subjects with flat venous curves had normal capillary curves; 1 subject had low normal peaks for both blood samples. It is concluded that use of capillary blood will eliminate flat curves in normal individuals and that peak rises in blood glucose of more than 20 mg/100 ml will occur in some patients with lactase deficiency. It is also concluded that the 50-g, 60-min. venous lactose tolerance test is useful in detecting lactase deficiency, if both peak rise in blood glucose and development of symptoms are noted.

11514 INTESTINAL DISACCHARIDASES IN TROPICAL SPRUE. (E.) Desai, H. G. (Tata Mem. Hosp., Bombay, India), A. V. Chitre, D. V. Parekh and K. N. Jeejeebhoy. Gastroenterology 53(3): 375-380, 1967.

Disaccharidase activity was measured in the jejunal mucosa obtained by peroral biospy in 22 control subjects (21-62 years old, mean 34), in 12 subjects with chronic gastritis or duodenal ulcer, and 50 adult patients (14-70 yr. old, mean 35 yr.) with tropical sprue. The latter had chronic diarrhea not due to pathogens or specific anatomical lesions of the intestine; 82% had steatorrhea, 76% had ^{58}Co vitamin B_{12} malabsorption, and 48% had D-xylose malabsorption. Each patient had malabsorption of at least 2 of the above test substances, and abnormalities of the jejunal mucosa (surface convolutions or leaves and convolutions) were observed under the dissecting microscope in 62%. In 22 controls, the mean and range of lactase, sucrase and maltase levels in specimens of jejunal mucosa were 14.6 (1.6-33.0) U, 69.0 (17-188) U, and 181.0 (47.0-456) U, resp.; in 12 subjects with gastritis or ulcer, the mean and range of lactase levels in specimens of jejunal mucosa was 10.7 (0-46.0) U. In 50 patients with tropical sprue, the mean and range of lactase, sucrase and maltase levels in jejunal mucosa were 3.3 (0-27.0) U, 45 (0-143) U, and 131 (12-327) U, resp. Lactase was less than 1 U in 64% of the patients. The lactase levels observed in Indian controls were low as compared with those reported from western populations. The patients with tropical sprue had significantly lower lactase values than controls; and sucrase and maltase values were also low in some patients, but not significantly so. No correlation was noted between the dissecting microscopic appearances of jejunal mucosa and disaccharidase levels. After admin. of tetracycline (1 g/day in divided doses) for 2 wk. to 7 patients with tropical sprue, lactase activity increased in only 2 patients, while sucrase increased in 6 patients and maltase increased in 4 of 5 patients studied. In patients with tropical sprue, low lactase levels were found even in those who consumed more than 8 ounces of milk/day, and there was no significant relationship between milk intake and lactase levels.

11515 MODIFICATION IN THE XYLOSE ABSORPTION TEST AS AN INDEX OF INTESTINAL FUNCTION. (E.) Sammons, H. G. (East Birmingham Hosp., England), D. B. Morgan, A. C. Frazer, R. D. Montgomery, W. M. Philip and M. J. Phillips Gut 8(4):348-353, 1967.

Xylose excretion in the urine after doses ranging from 0.5-25 g was determined in normal subjects and patients (44) with enteropathy; the 2-hr. and 5-hr. excretion and the 2:5 hr. excretion ratio was determined. All of the enteropath patients had a serum urea level less than 50 mg% and no proteinuria; 4 had gluten-induced enteropathy affecting the upper small intestine with marked steatorrhea; 4 others had steatorrhea but a completely normal absorption of xylose, and 4 had partial gastrectomy; 28 had a low 2-hr. and 4 had a low 3-hr. excretion. The pattern of excretion in 5 normal subjects after doses varying from 0.5-25.0 g showed a departure from linearity for doses greater than 5 g. After a 5-g dose in 52 normal subjects the results for the 5-hr. excretion of xylose were identical with the results reported in the literature, the mean value being 35%, with a range of 23-48. Cumulative excretion of xylose over a 24-hr. period after a 5-g dose in 29 tests on 19 normal persons and 10 tests on 4 patients with gluten-induced enteropathy showed that the 5-hr. excretion was similar in both groups, but the patients with enteropathy excreted less in the first 2 hr. Study in more detail showed that normal subjects put out more than 50% of their 5-hr. excretion in the first 2 hr., but gluten-patients put out less than a third of their 5-hr. excretion in the first 2 hr. The max. excretion of xylose in 4 patients with partial gastrectomy was in the first hr., which is consistent with the

id entry of xylose into the small intestine
these patients. Using this modification,
airment of xylose absorption was demonstrated
28 cases, even when the total 5-hr. xylose
orption was normal; in some cases there were
er abnormalities suggestive of malabsorption,
reby supporting the view that the low 2-hr.
retion of xylose is usually attributable to
er intestinal malabsorption rather than de-
ed stomach emptying. It is concluded that a
ll p.o. dose of D-xylose (5 g) gives good
dence of small intestinal malabsorption when
excretion is followed in the urine; much
ter localization of the intestinal defect can
gained by measurement of the 2-hr. and 5-hr.
nary excretion after this dose. A normal 5-hr.
retion may be accompanied by a lowered 2-hr.
retion, thus still indicating the presence of
er small intestinal disease.

16 TOPICS IN CLINICAL MEDICINE. INCIDENCE
AND IMPLICATIONS OF LACTASE DEFICIENCY
MILK INTOLERANCE IN WHITE AND NEGRO POPULA-
NS. (E.) Bayless, T. M. (Johns Hopkins U.
Med., Baltimore, Md.) and N. S. Rosensweig.
ns Hopkins Med. J. 121(1):54-64, 1967.

clinical manifestations of lactase deficiency
milk intolerance include abdominal bloating
cramps, and diarrhea. Methods of confirming
agnosis of lactose intolerance or lactase
ciency include observation of patients after
estion of large amounts of lactose or milk;
of the lactose tolerance test; and assay of
ase activity in the intestinal mucosa. Lactose
rance tests were given to 40 healthy males
54 yr. old); there were 19 milk-tolerant
ects with no history of symptoms with milk
stion and 18 of the 19 had a rise in blood
r over 25 mg%; in contrast, 21 who were milk-
lerant had lower peaks and 15 had blood sugar
s of less than 25 mg%. None of the milk-
rant subjects had symptoms with a lactose
. Assay of jejunal mucosal biopsy specimens
lactase showed that 15 of the 21 milk-intolerant
ects had enzyme levels that were lower than
of the milk tolerant subjects; there were 6
ects who were milk intolerant but without
ase deficiency; 2 were lactose intolerant.
ncidence survey was performed on the same 40
thy male volunteers who were unselected
pt that there were 20 Negroes and 20 Caucasians;
bject had a peptic ulcer. These were inter-
ed for a history of milk intolerance; sugar
rance tests and jejunal biopsies for dis-
aridase assay were performed on all of them.
teen of 20 Negroes gave a history of milk
lerance in contrast to only 2 of 20 Caucasians;
f 20 Negroes had symptoms with the lactose
rance test and 15 had a flat lactose tolerance
e (less than 25 mg% rise); this was in con-
t to the Caucasian subjects, of whom only 2
similarly affected. Fourteen of 20 Negroes
) had lower lactase levels than any of the
-tolerant subjects; only 1 of the 20 Caucasian
ects had low lactase levels. The marked
racial difference suggests a genetic etiology for this lactase deficiency.

11517 A STUDY OF PROXIMAL AND DISTAL INTESTINAL STRUCTURE AND ABSORPTIVE FUNCTION IN IDIOPATHIC STEATORRHOEA. (E.) Stewart, J. S. (West Middlesex Hosp., England), D. J. Pollock, A. V. Hoffbrand, D. L. Mollin and C. C. Booth. Quart. J. Med. 36(143):425-444, 1967.

Jejunal and ileal biopsies, proximal absorption tests of the jejunum (xylose, glucose, folic acid, pyridoxine and ascorbic acid studies) and distal absorption tests of the ileum (vitamin B_{12} study) were carried out in 50 control subjects and 60 patients (aged 14-75 yr., 26 males and 34 females) with proven idiopathic steatorrhea. Control subjects revealed jejunal biopsy patterns predominantly of finger-shaped, narrow leafy and/or broad-based leafy villi (1 patient only). These villus changes occurred in a continuous sequence throughout the jejunal sections examined. Ileal biopsies obtained from 10 control subjects revealed finger-shaped villi in 5 subjects, a mixture of finger-shaped and narrow leafy villi in 4 subjects and narrow leafy villi in 1 subject. The jejunal patterns in biopsies obtained from the patient group revealed either flat mucosae or mucosae in a mosaic pattern, both showing a continuous progression of abnormal changes throughout the sections examined. These different mucosal alterations were found simultaneously at different levels in the same patient and in siblings. A convoluted pattern developed in those patients exhibiting flat mucosa and who were then fed a gluten-free diet. Ileal sections revealed either normal structure or less-involved structure as compared to jejunal sections. There appeared to be no relationship between the jejunal mucosal structure and absorptive capacity. Correlation did exist between both the ileal surface height and the vitamin B_{12} absorption as well as between the degree of steatorrhea and the degree of vitamin B_{12} malabsorption. It is indicated that the severity of steatorrhea is best assessed by the reserve absorptive capacity of the ileum rather than that of the jejunum.

11518 MALABSORPTION IN THE TROPICS: A SECOND LOOK. I. THE ROLE OF PROTEIN MALNUTRITION. (E.) Mayoral, L. G. (U. del Valle, Sch. Med., Cali, Colombia), K. Tripathy, F. T. Garcia, S. Klahr, O. Bolaños and J. Ghitis. Amer. J. Clin. Nutr. 20(8):866-883, 1967.

Adult patients (15) of a low socioeconomic level were divided into 2 groups: Group 1 (7 patients) presented with severe protein deficiency with 4 of these patients having severe hookworm infestation and Fe-deficiency anemia and Group 2 (8 patients) presented with both hookworm infection and anemia but no protein malnutrition. Those patients from Group 1 without hookworm infestation or anemia showed both abnormal small intestinal absorption and mucosal changes consonant with a malabsorption syndrome. Patients from Group 1 with all 3 conditions showed similar findings. Both patient groups showed regression of their malabsorption syndromes when placed on an adequate protein diet. None of the patients from Group 2 demonstrated any signs of malabsorption at any time. This suggests a noncausal relationship between horkworm disease and the malabsorption syndrome. In addition, the causal role of Fe-deficiency anemia in protein malabsorption is doubtful. It is noted, however, that in severe cases of Fe-deficiency anemia, secondary protein malnutrition may result from interference with the appetite process. In addition, the hookworm disease and Fe-deficiency anemia in patients suffering a concomitant malabsorption syndrome induced by protein malnutrition do not of themselves affect the potential regression of the malabsorption syndrome with proper protein regimen.

11519 INTESTINAL ABSORPTION AFTER GASTRECTOMY AND AFTER VAGOTOMY WITH DRAINAGE OPERATION. (Pol.) Cichecka, K. (2nd Intern. Dis. Clin., Cracow, Poland), M. Dabrowski, H. Driżdż, A. Jędrychowski, S. Kirchmayer and M. Mysik. Pol. Arch. Med. Wewnet. 38(6):693-701, 1967.

Intestinal absorption of fats, vitamin A, D-xylose and glucose was studied in 14 patients with partial gastrectomy (Group 1), in 12 with vagotomy with pyloroplasty (Group 2), and in 5 with vagotomy with antrectomy (Group 3). Fat-loading tests indicated an increased excretion of fats in all 3 groups. Impairment of fat absorption was most frequently found in Group 3 (4 of 5 patients), less frequently in Group 1 (6 of 14) and Group 2 (5 of 12). However, the degree of impairment was greatest in Group 1 (21.54 g in 24-hr. stools), lower in Group 3 (12.52 g) and lowest in Group 2 (7.26 g). Stools after gastrectomy contained mostly fatty acids, in Group 2 there was an increase of neutral fats and in Group 3 an approx. equal increase of fatty acids and neutral fats. The majority of patients with impaired fat absorption had no diarrhea, some even suffered from constipation. Diarrhea of short duration followed by periods of constipation was observed in 23% of the patients in all 3 groups. There was no correlation between loss in body wt. and the severity of impairment in fat absorption, probably because daily losses of fat in the stools were not large enough (15.9%) to produce diarrhea or a decrease in body wt. The serum carotene level was insignificantly lower in 2 of Group 2, 3 of Group 3 and 3 Group 1 patients. Decreased levels of serum vitamin A was found in 3 of Group 3, 4 of Group 1 and 1 of Group 2. After p.o. loading of vitamin A (150,000 U) the increase of serum vitamin A level was 35% smaller than normal after partial gastrectomy but in Group 2 and 3 it differed only slightly from normal. About 50% of the patients in all 3 groups showed impaired D-xylose absorption. An increase in glucose absorption was observed in the majority of patients with an av. of 31.2 g for patients wi vagotomy and 32.7 g for gastrectomy patients (av. norm 27 g).

11520 CARBOHYDRATE ABSORPTION IN MALNOURISHE CHILDREN. (E.) Bowie, M. D. (U. Cape Town, South Africa), G. O. Barbezat and J. D. L. Hansen. Amer. J. Clin. Nutr. 20(2):89-97, 1967.

Twenty children with severe protein-calorie malnutrition (kwashiorkor) were studied for carbohydrate absorption. Lactose malabsorption occurred in 65% of the children, and it was not transient. Return of lactose absorption to normal was not demonstrated even after 1 yr. of follow-up, but follow-up studies were limited i time and numbers. The malabsorption of lactose was due to diminished or absent lactase activit and this was presumably an acquired deficit secondary to the mucosal damage which occurs in malnutrition. No evidence was found of malabsorption of other disaccharides (sucrose and maltose), although diminished sucrase activitie were found in some patients. The evidence of lactose malabsorption from stool wt., lactic acid content and presence of sugar correlated well with the evidence of malabsorption obtaine by consideration of lactose tolerance tests and absorption ratios.

11521 ABSORPTION OF ^{131}I-TRIOLEIN IN POSTOPERATIVE GASTROINTESTINAL PARALYSIS. (E.) Póka, L. (Univ. Med. Sch., Pecs, Hungary) I. Földi, G. Czirbusz, M. Németh-Csóka, S. Fark and I. Bartek. Acta Chir. Acad. Sci. Hung. 8(2):183-189, 1967.

Gastrointestinal paralysis was experimentally induced in dogs, and the assimilation of ^{131}I-triolein, changes in the condition of gastrointestinal tract and in pancreatic activity wer studied. Postoperative findings were similar to those previously noted in humans, in that th absorption of triglycerides decreased significantly, the motor activity of the small intesti remained practically unchanged, the small intestine was only rarely distended, and the pancreatic enzymes were sufficient for hydrolyzing the foodstuffs admin. It is suggested that disturbances in absorption, rather than digestion, inhibit the utilization of triglycerides. During gastrointestinal paralysis the intraluminal conditions of the small intestine were found to be adequate for absorption and digestion. It is concluded that disorders of absorption must result from a reduction of the transport activity of the intestinal mucosa.

11522 GLUCOSE MALABSORPTION AND INTESTINAL HISTOPATHOLOGY IN Trichinella spirali INFECTED GUINEA PIGS. (E.) Castro, G. A.

. Massachusetts, Amherst), L. J. Olson and
D. Baker. *J. Parasit.* 53(3):595-612, 1967.

vitro and *in vivo* studies using guinea pigs
perimentally infected with *Trichinella spiralis*
nducted over a 28-day infection period showed
at the capacity of the small intestine to
sorb glucose was significantly reduced in
imals infected with 10,000 but not 5,000 larvae.
paired absorption was first detected in the
rst 75% of the intestine on day 3, then on day
for the last 25%. The first and second
arters were capable of normal glucose uptake
day 14, whereas uptake in the third quarter
mained impaired. On days 21 and 28 malabsorp-
on was observed only in the fourth quarter.
e impaired glucose uptake was associated with
e following histologic changes: a loss of nor-
l villous pattern, aberrant epithelial cells
d inflammation of the lamina propria.
ronologically, these alterations occurred in
e anterior half of the intestine during early
fection and later extended into the posterior
rtion. Likewise, there was a shift in the
lative distribution of worms from the anterior
the posterior end of the small intestine as
fection time progressed. Only a small fraction
a dose of 10,000 larvae could be recovered
om the small intestine following infection:
0% the first wk., 1.8% on day 14, 0.2% on day
and rarely any on day 28.

23 THE INFLUENCE OF CYTOSTATIC CHEMO-
THERAPY WITH AMETHOPTERIN UPON THE
PLY OF THIAMINE. (Ger.) Berndt, H. (Cancer
. Inst., Berlin) and I. Kutschke. *Klin. Wschr.*
16):845-847, 1967.

nary thiamine levels were studied in 27
ients with bronchiolar carcinoma treated with
g/day of methotrexate for 14 days. Three
ies of tests were made, the first with sub-
ts receiving chemotherapy only, the second
h 50 mg/day of thiamine, and the third with
mg/day of thiamine tetrahydrofurfuryldisulfide,
inning on the tenth day of chemotherapy.
nsketolase activity in RBC hydrolyzates was
o measured. Methotrexate induced malabsorp-
n of thiamine and the resulting thiamine
iciency was marked by a depressed urinary
retion of thiamine in the first series (from
to 136 µg/day; 0 and 20 days) and by de-
ased activity of transketolase in RBC (from
4 to 16.9 U). Intake of additional thiamine
not fully correct this situation; the corre-
nding values in the second series were from
to 145 µg/day and from 19.6 to 17.2 U. How-
r, in the third series the values were 150 to
270 µg/day and 18.9 to 22.9 transketolase U.
amine tetrahydrofurfuryldisulfide is absorbed
rapidly restores normal activity of the
nsketolase. To prevent thiamine hypovitaminosis,
s thiamine compound should be admin. during
cer chemotherapy.

11524 CRITICAL ANALYSIS OF AN ENTERIC ABSORPTION TEST. BEHAVIOUR OF HOURLY EXCRETION AND OF FLUID BALANCE IN THE COELIAC MALABSORPTION SYNDROME. (E.) Campos, J. V. M. (U. Sao Paulo, Brazil), D. Barbieri, G. Quarentei, J. M. M. Coronel and K. Hashisume. *Arq. Gastroent. (Sao Paulo)* 4(1):17-38, 1967.

An enteric absorption test was performed on 12 normal children (Group 1; 4-10 yr. old) and 11 (Group 2; 2-9 yr. old) with the celiac malabsorption syndrome; the clinical picture of the latter group was used due to its uniformity as an experimental model syndrome. Children with celiac malabsorption syndrome were divided into 2 groups: A, 8 with enteric histopathology characteristic for "gluten-induced celiac transformation" and B, 3 with histopathology characteristic of "catarrhal enteropathy" (varied degrees of thickening and shortening of villosities, with an intense lymphoplasmocytic infiltration of the villous membrane). Using 2 test substances simultaneously, D-xylose (5 g) and glycine (0.5 g/kg), and by standardizing hydration conditions, the following parameters were analyzed: 1) control of liquid balance; 2) study of the hourly partition of the urinary vol.; and 3) determination of the corresponding rates of eliminated test substances. Water intake (ml, av./m^2) for Groups 1 and 2 A and B were, resp., 323.0, 354.0 and 328.0, while urinary excretion (total, ml/m^2) were, resp., 606.4, 527.0 and 789.0. An obvious diuresis was noted. Urinary elimination of D-xylose (over a 5-hr. period) showed in Group 1 an av. of 30% of the ingested dose; in Group 2 A, this was 17.3% (below normal) and in Group 2 B, it was 24.0%. In Group 2 A, there was an delayed elimination of xylose and decreased values during the initial 2 hr.; Group 2 B more closely followed that of Group 1. Urinary elimination of glycine (over a 5-hr. period) showed, as a percentage of the admin. dose, 4.3%, 5.4% and 3.0%, resp., for Groups 1, 2 A and 2 B. In Group 1, there was significant elimination during the first hr., max. during the second hr., followed by progressive reduction and intense reduction during the final hr.; in Group 2 A, there was delayed elimination during the first hr., followed by significant increase in elimination during the third and fourth hr., and reduction during the fifth hr. In Group 2 B, glycine urinary elimination was characterized by nearly normal behavior. Fluid balance studies showed an osmotic diuresis, especially caused by D-xylose. It was shown that osmotic phenomena are not limited only to depuration, but also exist in the small intestine, especially in Group 2 A, where they were associated with the process of stagnation of the hypotonic loops. Absorption of the test substances was dependent not only on the functional conditions of the enteric epithelium, but also could be related to abnormal stagnation, osmotic dilutions and movement of intestinal fluids. D-Xylose, being more intensely depurated of the 2 test substances, more exactly reflected the phenomenon of intestinal absorption. When analyzing results of an enteric absorption test as used in this study, an upward deviation from normal may attest to the great capacity of absorption of the mucous surface of the normal small intestine.

absorption of the mucous surface of the normal small intestine.

11525 INTOLERANCE TO LACTOSE. (Fr.) Nordio, S. and A. Berio. Bol. Soc. Catalana Pediat. 27(123):448-483, 1966.

11526 IMPLICATION OF INTESTINAL MALABSORPTION SYNDROME IN PATHOLOGY OF THE SKIN. (Rum.)(Rev.) Bucur, G. (Dermato-Venerol. Ctr., Bucharest). Derm.-Vener. Halad. 12(4):355-362, 1967.

11527 ULTRASTRUCTURE OF JEJUNAL SURFACE EPITHELIUM IN UNTREATED IDIOPATHIC STEATORRHOEA. (E.) Shiner, M. (Cent. Middlesex Hosp., London). Brit. Med. Bull. 23(3):223-225, 1967.

11528 HEREDITARY ABNORMALITIES OF INTESTINAL ABSORPTION. (E.) Milne, M. D. (Westminster Med. Sch., London). Brit. Med. Bull. 23(3):279-284, 1967.

11529 RELATIONSHIP OF THE INTESTINAL BACTERIAL FLORA TO ABSORPTION. (E.) Tabaqchali, S. (Roy. Postgrad. Med. Sch., London) and C. C. Booth. Brit. Med. Bull. 23(3):285-290, 1967.

11530 THE INTESTINAL MUCOSA AND IRON ABSORPTION. (E.) Callender, S. T. (Radcliffe Infirm., Oxford, England). Brit. Med. Bull. 23(3):263-265, 1967.

11531 ON THE FAMILIAR INCIDENCE OF IDIOPATHIC SPRUE AND THE SIGNIFICANCE OF PREGNANCY AND PARTIAL GASTRECTOMY FOR THE MANIFESTATION OF THE SYMPTOMS. PRELIMINARY REPORT. (E.) Ek, B. (Umea U., Sweden). Acta Med. Scand. 181(1): 125-126, 1967.

11532 COMPENSATORY CHANGES IN INTESTINAL ABSORPTION. (E.) Dowling, R. H. (Roy. Postgrad. Med. Sch., London). Brit. Med. Bull. 23(3):275-278, 1967.

11533 INHIBITION OF INTESTINAL ABSORPTION. (E.) Sanford, P. A. (U. Sheffield, England). Brit. Med. Bull. 23(3):270-274, 1967.

11534 PATHOPHYSIOLOGY OF SMALL INTESTINE ABSORPTION. (Ger.)(Rev.) Volkheimer, G. (1st Med. U. Clin., Berlin). Wien. Klin. Wschr. 79(36):658-660,664, 1967.

11535 TROPICAL SPRUE FROM THE PHILIPPINES: REPORT OF THREE CASES. (E.) Sparberg, M., K. B. Knudson and S. Frank. Milit. Med. 132(10):809-815, 1967.

11536 CELIAC SYNDROME, HISTOLOGICAL PICTURE OF MUCOSA AND SOME CLINICAL PHENOMENA. (Cz.) Plachý, V. (Charles U., Hradec Kralove, Czechoslovakia), M. Hradský, F. Langr and A. Peregrinová. Cesk. Pediat. 22(7):581-584, 1967.

11537 THE "BATTERED CHILD" AND THE CELIAC SYNDROME. (E.) Kunstadter, R. H. (Northwestern U. Med. Sch., Chicago, Ill.), M. H. Singer and R. Steinberg. Illinois Med. J. 132(3):267-272, 1967.

11538 SUGAR MALABSORPTION DUE TO DEFICIENCIE OF DISACCHARIDASE ACTIVITIES AND OF MONOSACCHARIDE TRANSPORT. (E.)(Rev.) Holzel, A. (U. Manchester, England). Arch. Dis. Child. 42(224):341-352, 1967.

11539 DISACCHARIDE INTOLERANCE. (PRESENTATION OF TWO CLINICAL CASES.) (It.) Signoretti, A. (U. Rome), V. Bonanni, M. Taccone and E. Parisella. Riv. Clin. Pediat. 78(5): 609-619, 1966.

See also abstract nos.: 10958,11013,11065,11673,11928

40 COLITIS CYSTICA PROFUNDA. (E.)
Wayte, D. M. (Armed Forces Inst. Path.,
hington, D. C.) and E. B. Helwig. Amer. J.
n. Path. 48(2):159-169, 1967.

otal of 24 patients (15 men, 9 women) with
mucosal mucous cysts of the rectum and colon
described. These were divided into 2 groups:
up 1, 5 men (4-68 yr. old, mean age of 36
) with diffuse type of profound cystic colitis,
which cysts were located in extensive areas
the large intestine; and Group 2, 19 subjects
men, 20-51 yr. old, with a mean age of 28 yr.,
9 women, 20-52 yr. old, with a mean age of
with the localized type of profound cystic
itis, in which the cysts were confined to a
tinct area of the rectum at a distance
ween 5-12 cm from the anal margin. Presenting
ptoms of the 5 subjects with the diffuse
e of colitis included clinical ulcerative
itis of 4 and 3 yr. duration in 2 patients;
onic infective dysentery caused by Salmonella
port that was resistant to antibiotic therapy
1 (the yound child); and 2 with intermittent
tal bleeding. In the 19 with localized
itis, presenting symptoms included bright
rectal bleeding, mucous discharge, intermittent
rrhea and rectal prolapse. The most frequent
nical sign in the latter group was a mass,
yp or plaquelike-thickening in the rectum at
istance between 5-12 cm from the anal margin;
f these had a history of previous surgery in
affected area of the rectum. Of those with
diffuse form, the 2 with ulcerative colitis
e a good recovery, and 2 with multiple polyps
overed after colectomy and local resection.
19 with the localized type, follow-up was
cessful in 17; 12 suffered no further
ptoms after local resection, and 4 continued
have colitis symptoms. Only 1 woman required
ther local rectal surgery and removal of
mucosal cysts for continuing symptoms 11 yr.
er the first operation, and made a good
overy. It is thought that the submucosal
ts and glands found in this condition result
m the extension of surface mucosa along
nulation tissue tracts created through the
cularis mucosa. The differentiation from
nocarcinoma, and particularly the importance
careful cytologic evaluation, is stressed,
order to avoid a mistaken diagnosis of malig-
cy (which was done in one case in this series).

1 CANCER OF THE COLON: THE INFLUENCE OF
THE NO-TOUCH ISOLATION TECHNIC ON
VIVAL RATES. (E.) Turnbull, R. B., Jr.
eveland Clin. Found., Ohio), K. Kyle, F. R.
son and J. Spratt. Ann. Surg. 166(3):420-427,
7.

rative manipulation of a cancer-bearing segment
colon will increase the incidence of fatal
astasis. A computer analysis study was undertaken of the results of 2 methods of surgical treatment of 896 patients with cancer of the colon; 664 patients were treated by 1 surgeon, who used a no-touch isolation technic when resection was indicated, and 5 other surgeons treated 232 patients, using a conventional technic when resection was indicated. With the no-touch isolation technic, the cancer-bearing segment was not manipulated or handled in any manner until after the lymphovascular pedicles were divided and ligated and the colon was divided at the elected sites for resection; the conventional technic was characterized by ligation and division of the lymphovascular pedicles after mobilization of the cancer-bearing segment. The death rate from metastatic cancer was much greater during the 2 yr. after the conventional technic resection; most of the deaths were due to metastasis to the liver, and it is suggested that this greater incidence of fatal hepatic metastasis was secondary to operative manipulation of the cancer-bearing segment. The age-corrected 5-yr. survival rate in 460 patients who underwent "resection for cure" with the no-touch isolation technic was 81.6%. It is suggested that these greatly improved survival rates were due to use of the no-touch isolation resection method and that the heretofore conventional manipulative resection technics for cancer of the colon should be abandoned.

11542 CAECAL TUBERCULOSIS. (E.) Anscombe, A. R. (Roy. Infirm., Manchester, England), N. C. Keddie and P. F. Schofield. Gut 8(4):337-343, 1967.

Nine cases (2 men, 7 women; 25-88 yr. old) of tuberculosis of the cecum are described. Five of 9 patients gave a history of 6 mo. or less, and deterioration in general health was rapid, wt. loss and anemia being found in all patients. Abdominal pain was present in 8 of 9, diarrhea in 7, being constantly present in 4; 5 had blood in the feces. A mass in the right iliac fossa was found in 8 of 9 patients; in 7 (all female), a provisional clinical diagnosis of carcinoma of the cecum was made. Seven patients studied by a Ba enema showed an abnormal appearance of the right colon, being interpreted as due to carcinoma. One of 9 cases had tubercle bacilli in the sputum, and 1 of 2 patients had the same in feces. All patients were subjected to laparotomy, and a right hemicolectomy was done in 8; 7 of 8 survived the operation, and 6 remained well to the time of report, the period of follow-up being 1-12 yr. Two of the longterm survivors had antituberculous chemotherapy with no apparent advantage over the 4 patients who were not so treated. All cases in this series were hypertrophic; the cecum was the site of max. involvement, with secondary affection of the regional lymph nodes; the terminal ileum was involved only in advanced cases. It is suggested that, on the basis of clinical and pathological evidence presented, this condition should be designated "cecal tuberculosis" and that use of the term "hypertrophic ileocecal tuberculosis" should be discontinued. This series demonstrates that cecal tuberculosis must be kept in mind as a differential diagnosis of carcinoma.

11543 ENVIRONMENTAL FACTORS OF CANCER OF THE COLON AND RECTUM. (E.) Wynder, E. L. (Sloan-Kettering Inst. Cancer Res., New York, N. Y.) and T. Shigematsu. Cancer 20(9):1520-1561, 1967.

A retrospective study of 791 patients (458 men and 333 women, plus age-matched controls) with cancer of the large intestine is presented. Colonic cancer appeared to be more common among the Jewish population in New York City; this trend also was observed for men in this study, whereas among Jewish women there was an excess of cases of rectal as well as colonic cancer. The socioeconomic status of patients with colonic cancer appeared to be somewhat higher than that of patients with rectal cancer. Data from this investigation, when taken alone, could not establish a major environmental factor or factors relating to the development of cancer of the large intestine. On the basis of the total epidemiologic evidence with which the data of this study were consistent, dietary factors appeared to be associated with the etiology of cancer of the large intestine; the dietary pattern which may fit the distribution of cancer of the large intestine includes a high intake of fats; the effect of this pattern appeared to be more marked for cancer of the colon than cancer of the rectum. Dietary information on specific food items as obtained in retrospective histories was of little value in determining the influence of diet on colonic cancer. Epidemiologic evidence suggests some differences in the etiology of cancer of the colon and rectum; the epidemiology of cancer of the rectosigmoid regions appeared to fit more closely with cancer of the colon than with cancer of the rectum. There was a statistically significant association of obesity to cancer of the large intestine from the cecum to the sigmoid colon in men. Among women a number of patients with cancer of the sigmoid weighed somewhat less than controls, whereas patients with disease of other areas of the large intestine were somewhat heavier, although not significantly so, than control cases. These findings related to body wt. may represent a secondary rather than a primary association. There was a slight association between cigar smoking and cancer of the colon in men; cigar smoking was related to noncigarette smoking, particularly in men with cancer of the sigmoid colon. Both of these factors related to obesity and a Jewish affiliation; cigar smoking and noncigarette smoking are regarded as secondary and not primary associations. Constipa tion was associated to a minor degree with cancer of the large intestine. Among men it affected principally patients with cancer of the sigmoid and to a smaller extent the other sites; among women, the association held only for groups with cancer of the cecum through the descending colon. An association of obesity to constipation was found. Constipation findings therefore, may also represent an incidental rather than a primary association. No significan relationship was found between cancer of the large intestine and any medical disease apart from ulcerative colitis. There was no relationship to any kind of previous surgery. The relationship to appendectomy suggested by some investigators appeared to relate to differences in epidemiologic background that determines the chance of appendectomy rather than being etiologically related to a large intestinal cancer. Some genetic or familial basis seemed to exist for cancer of the large intestine, especially among younger individuals with large intestinal cancer. Patients with cancer of the large intestine appeared to be particularly prone to develop a secondary primary lesion within the large intestine, a finding of particular clinical interest. It is suggested that analytical chemical, biochemical and bacteriological studies be undertaken to determine differences in the composition of feces as may exist among populations with high and low rates of cancer of the large intestine.

11544 IDENTIFICATION OF THE ROUTE OF ACTION OF THE CARCINOGEN 3:2'-DIMETHYL-4-AMIN BIPHENYL IN THE INDUCTION OF INTESTINAL NEOPLASI (E.) Cleveland, J. C. (Hahnemann Med. Coll. Hosp., Philadelphia, Pa.), S. F. Litvak and J. W. Cole. Cancer Res. 27(4):708-714, 1967.

Wistar rats of both sexes were divided into 4 groups; Group 1 received weekly s.c. inj. of 20 mg of 3:2' dimethyl-4-aminobiphenyl; Group 2, approx. 50% of the colon was defunctionalized by taking out of continuity the midportion of the colon but allowing it to remain *in situ* with the nerve-blood supply intact; the proximal end was closed and the distal end exteriorized on the abdominal wall as a mucous fistula; intestinal continuity was restored by colocolostomy with end-to-end anastomosis; after recovery the rats received the drug as in Group 1; Group 3, subtotal colectomy was performed resecting the colon from a point just proximal to the ileocecal valve to within 1 cm of the anal orifice; continuity was restored by ileoproctostomy; the rats then received the drug as in the previous 2 groups; and Group 4, the controls, received inj. of peanut oil only. In Group 1, 7 of 17 (41%) developed intestinal tumors; 6 were in the colon or rectum and 1 in the ileum. In Group 2, 9 of 18 (50%) developed intestinal tumors; 6 were in the colon or rectum, 2 in the rminal ileum and 1 in the jejunum. All tumors ccurred in the intestine that had direct contact th the fecal stream, and none of the animals ad any lesion occurring in the viable, efunctionalized loop. None of 6 animals in roup 3 developed intestinal tumors, and none Group 4 developed intestinal neoplasia. nterpretation of these experiments suggests at the chemical is absorbed from the inj. site, odified, probably in the liver, excreted into e bile, and neoplasia induced by direct ntact of feces with intestinal mucosal cell.

545 INTRALUMINAL CHEMOTHERAPY (HN2 OR 5-FU) ADJUVANT TO OPERATION FOR CANCER OF IE COLON AND RECTUM. II. FOLLOW-UP REPORT OF CASES. (E.) Rousselot, L. M. (St. Vincent's sp., New York, N. Y.), D. R. Cole, C. E. Grossi, J. Conte and E. M. Gonzalez. Cancer (5):829-833, 1967.

5-yr. progress report is presented of a method intraluminal chemotherapy adjuvant to operation r cancer of the colon and rectum. This chnic involves sequestering the pathological gment between tape ligatures; a cancericidal ug is then inj. into the lumen within the ped area. Clamping of the pedicle vessels designedly-delayed 30 min. in order to allow x. dosage absorption. In the 5-fluorouracil-eated group, the agent is repeated i.v. on stoperative days 1 and 2. A total of 97 tients was followed up to 5 yr. in the eated series, and 268 patients were followed the control series. Nitrogen mustard and fluorouracil were used. There was no significant rise in morbidity or mortality associated th the technic. Survival follow-up studies of e nitrogen-mustard-treated group at the end 5 yr. showed no improvement over the controls. wever, in the 5-fluorouracil-treated group patients, the increased trend in survival noted 3 yr. continued to be sustained at 4 yr. t time of report).

546 EFFECT OF COLOSTOMY ON EXPERIMENTALLY PRODUCED NEOPLASMS OF THE COLON OF THE T. (E.) Navarrete, A. (Baylor Univ. Coll. d., Houston, Tex.) and H. J. Spjut. Cancer (9):1466-1472, 1967.

order to determine the effect of the fecal ream in the pathogenesis of experimentally-oduced colonic tumors in Wistar strain rats emale), simple colostomies were performed in e left colon of 57 rats at approx. 4 cm above e anus. A total of 54 rats received daily c. inj., 5 days/wk., of the carcinogen 2'-dimethyl-4-aminodiphenyl at a dosage of mg/day/100 g. Of the 54 rats, 17 (31.4%) veloped either hyperplasia, adenomatous polyps carcinoma of the large intestine proximal the site of colostomy. None of the 54 rats veloped any lesion distal to the colostomy. None of the 3 control rats with colostomies developed any kind of tumor. Of the colonic lesions that developed, 4 were carcinomas, 12 were adenomatous polyps and 12 were hyperplasias. All hyperplasias developed at the edge of the colostomy. It is concluded that diversion of the fecal stream prevents development of colonic neoplasms in Wistar rats in this experimental situation.

11547 RADIOGRAPHIC FEATURES OF THE MEGASIGMOID SYNDROME. (E.) Finby, N. (St. Luke's Hosp., New York, N. Y.) and E. Kraft. Johns Hopkins Med. J. 120(6):393-400, 1967.

The most common roentgenologic picture of megasigmoid consists of an extremely long and widened sigmoid whose loops are redundant. Frequently the sigmoid itself is observed beneath the diaphragm, therby simulating volvulus of the sigmoid. Chest radiographs may disclose an elevation of the left hemidiaphragm by the sigmoid or the positioning of the sigmoid between the diaphragm and the liver. The sigmoidal loops in this pattern are gas-filled and quite mobile in the abdominal cavity. The proximal colon is usually impacted with fecal material, which is passed infrequently into the sigmoid. Subsequent rectal impaction may occur and this is often hard to differentiate from that mechanical obstruction which results from a true sigmoid volvulus. A second common roentgenologic picture reveals the presence of large fecal masses in the sigmoid. These may remain for long periods of time leading eventually to mucosal ulceration. A third pattern is characterized by the sigmoid being filled with a continuous column of fecal material, rather than discrete fecal masses, which are sometimes surrounded by marginal gas pockets suggestive of intra-abdominal perforation. Such a spurious picture of perforation is especially evident when radiographs are taken with the patient in the erect position. Localization of this amorphous fecal mass in the sigmoid may eventually result in a terminal toxemia. These roentgenologic signs, when they are of long duration, should suggest a diagnosis of megasigmoid, especially in the older neuropsychiatric patient.

11548 IMMUNOGLOBULIN A: LOCALIZATION IN RECTAL MUCOSAL EPITHELIAL CELLS. (E.) Gelzayd, E. A. (U. Chicago Sch. Med., Ill.), S. C. Kraft and F. W. Fitch. Science 157(3791):930-931, 1967.

Immunofluorescence studies with monospecific antiserums to human serum immunoglobulins were performed on normal subjects and patients with various intestinal diseases (not specified); a direct immunofluorescent technic with goat antiserums (labeled with fluorescein isothiocyanate) to human serum immunoglobulins A, G and M, and sheep antiserum to rabbit γ-globulin was used. Indirect fluorescent antibody studies were done with rabbit antiserum to human immunoglobulin D. Immunospecific staining for immunoglobulin A was consistently revealed within the apical portion of the cytoplasm of mucosal epithelial cells of normal and abnormal human rectal biopsies; similar findings were noted in a smaller number of small intestinal, colonic and appendiceal tissues. The immunoglobulin A was not seen near the nuclei at the basal aspect of the cells or in the mucus-containing portion of the goblet cells; the cellular fluorescence was distributed along the entire epithelial layer lining the glandular duct, occasionally within the ducts and in the particulate matter of surface mucus. Immunoglobulins M, G and D were not demonstrated within mucosal epithelial cells. The predominance of lymphoid cells containing immunoglobulin A in the lamina propria of intestinal tissues was confirmed. The findings of immunoglobulin A within human intestinal epithelial cells may represent a transepithelial cell pathway for immunoglobulin A between the lamina propria and the luminal surface.

11549 ISO-ANTIBODIES TO COLON. (E.)
Ford, H. (U. Chicago, Ill.) and J. B. Kirsner. Int. Arch. Allerg. 31(5):449-454, 1967.

Young adult New Zealand white rabbits were inj. with normal homologous colon and Freund's complete adjuvant, and altered (inflamed) rabbit colon alone or with Freund's complete adjuvant. A course of immunization consisted of inj. 0.5 ml of a 1:10 emulsion of homogenized tissue in saline into each of 5 portals (i.m., i.p., s.c., i.v., and intradermal), 3 times a wk. for 3 wk. Each animal in both control and test groups received a total of 2.25 mg of tissue during each course of sensitization. In all but 6 animals the course of immunization was repeated up to 6 times (with a 2- or 3-wk. interval between courses), so that most animals received 13.5 g of tissue over a period of 9 mo. Sensitivity was tested using the hemagglutination test and agar gel-double diffusion test. Isologous circulating antibodies were induced only by inj. of large quantities of inflamed rabbit colon, together with Freund's complete adjuvant. Circulating antibodies were not demonstrable after inj. of normal homologous colon and Freund's complete adjuvant, nor after the inj. of inflamed rabbit colon alone.

11550 INCIDENCE OF DIVERTICULITIS. (E.)
Kyle, J. (Aberdeen Roy. Infirm., Scotland), A. O. Adesola, L. F. Tinckler and J. De Beaux. Scand. J. Gastroent. 2(1):77-80, 1967.

The hospital admission rates for symptomatic colonic diverticulitis in the populations served by the main teaching hospitals in Fiji Singapore, Nigeria and North East Scotland were estimated. The condition was found to be very rare in nonEuropeans, occurring in approx. only 1 person/million/yr. There was very little diverticulitis among the Malays, Chinese and Indians in Singapore. The incidence among non-Europeans in Fiji was probably slightly higher, but the numbers were too small for valid comparisons. Admission rates for diverticulitis was some 40-fold greater among Europeans living in the Tropics, and about 80-fold greater in Scotland. Among the Scottish cases, the disease appeared to be slightly more common in men under 50 yr., while from 70 yr. old and onwards, females predominated. Among the 206 Scottish patients, the av. age was 68 yr., while for Europeans in Singapore it was 59 yr. and in Fiji, 60 yr. In contrast, the Chinese patients in Singapore and the Nigerians both had av. ages of 54 yr., and Fijians av. 32 yr. It is concluded that the differences delineated in this study are due principally to the greater age and low-residue diet of the European populations.

11551 APPENDICECTOMY IN MEN. (E.)
Barraclough, B. M. (Graylingwell Hosp., Sussex, England). J. Phychosom. Res. 11(2):203-206, 1967.

A psychiatric study is presented of men (61) who had an appendectomy for pain in the right lower abdomen. All patients were interviewed after recovery from the operation and while in the hospital, and all completed the Tayler Manifest Anxiety Scale. Histologically, there were 48 abnormal and 13 normal appendices. The mean age of those with an abnormal appendix (30.8 yr.) was greater than those with a normal appendix (25.1 yr.). The normal group obtained much higher manifest anxiety scale scores (mean of 21.23 against 13.56 for those with an abnormal appendix). Four abnormal and 9 normal appendix patients required referral to a psychiatrist. The normal group had more frequently suffered parental loss before 16 yr. of age. This study has shown that among a group of patients who have pain in the right iliac fossa without any organic cause, indices of psychological disturbance are far more common than in a comparable group of patients who had appendicitis. The likely explanation for the abdominal pain is that it was one among a number of symptoms, all psychological in origin but accepted by the patient and doctor as the point of therapeutic attack.

11552 THE ORIGIN OF INFLAMMATION MACROPHAGES FROM BLOOD MONOCYTES OBSERVED IN ACUTE APPENDICITIS. (Ger.) Leder, L. D. (U. Kiel, Germany) and C. Pörksen. Klin. Wschr. 45(14):721-726, 1967.

esh human appendices were split longitudinally,
lf of each were fixed in formalin and prepared
r histology; the other half was cut into
ozen sections, tested for unspecific esterases,
l the cells in the transected blood vessels
served. The nucleated cells were differentially
unted in groups of 1000 under oil immersion;
served were granulocytes with segmented
clei, esterase-positive blood monocytes and
terase-negative lymphocytes. Eleven of the
pendices showed no changes from the normal
ndition and these served as controls; 33
owed all the signs of acute inflammation;
e connective tissue and the muscularis were
filtrated by numerous inflammatory cells
l large numbers of lymphocytes had accumulated
the blood vessels. A significant increase
the number of intravascular blood monocytes
s found. Migration pictures of monocytes
l striking morphologic and histochemical
milarities and even relationships between
ood monocytes and many inflammatory
crophages could be observed. These findings
dicate that inflammatory exudate macrophages
velop almost exclusively from migrated blood
nocytes. No evidence for the origin of
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553 TREATMENT OF CHRONIC RECTOSIGMOIDITIS.
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11631 RECTAL CANCER--DISCUSSION OF SURGICAL TREATMENT. (Rus.) Ryzhikh, A. N. Pp. 7-18 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11632 DEMONSTRATION OF HEPATIC METASTASES IN RECTAL CANCER BY MEANS OF EXTRA-ABDOMINAL UMBILICAL PORTOGRAPHY. (Rus.) Fain, S. N. Pp.120-129 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A.N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11633 CAUSES OF THE POSTOPERATIVE RECURRENCE OF THE RECTAL AND SIGMOID CANCER. (Rus.) Stoliarov, V. I. (Petrov Sci. Res. Inst. Oncol., Leningrad, USSR). Vop. Onkol. 13(8):42-46, 1967.

11634 5-FLUOROURACIL IN THE TREATMENT OF MALIGNANT TUMORS OF THE RECTUM AND LARGE INTESTINE. (Rus.) (Rev.) Shiiataia, O. K. and L. S. Evseenko. Pp.166-178 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

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11636 FIRST ATTEMPT AT TREATMENT OF LYMPHOGENOUS METASTASES BY RADIOACTIVE LYMPHOGRAPHY. (Rus.) Ryzhikh, A. N., S. N. Fain and A. Sh. Millerman. Pp.78-84 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966,387pp.

11637 BACTERIOLOGICAL STUDY OF INTRAOPERATIVE IRRIGATION IN CANCER AND POLYPOSIS OF THE RECTUM AND LARGE INTESTINE. (Rus.) Militarev, Iu. M. and O. P. Marko. Pp.63-67 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11638 NEOPLASM OF THE COLON. CLINICAL AND THERAPEUTIC CONSIDERATIONS WITH REFERENCE TO 80 CASES. (Rum.) Vexler, L. (Inst. Med Pharm., Iasi, Rumania), C. Filimon and V. Nour. Rev. Medicochir. Iasi 71(1):103-108,1967.

11639 RESECTION OF THE RIGHT HALF OF THE LARGE INTESTINE IN CANCER. (Rus.) Vinogradova, O. I. (Silifosov Sci. Res. Inst. Emergency Treatment, Moscow). Khirurgiia (Moskv 43(8):112-117, 1967.

See also abstract nos.: 10921,11076,11162,11215

0 ULCERATIVE OESOPHAGITIS IN ASSOCIATION
WITH ULCERATIVE COLITIS. (E.)
ndorff, C. (St. Thomas's Med. Sch., London)
N. W. T. Grieve. Gut 8(4):344-347, 1967.

-yr.-old white male presented with a 7-yr.
ory of intermittent joint pain and fever, 6
of episodes of diarrhea (more recently with
d and mucus in stools) and dysphagia of
easing severity for 2 yr.; on separate
sions he had been diagnosed and treated for
e rheumatic fever, diarrhea and buccal
ration, and finally ulcerative colitis. For
. he had been on continuous steroid therapy.
ure of an oropharyngeal swab revealed a mixed
th of commensals and included a scanty growth
Lancefield group A β-hemolytic streptococcus.
oidoscopy to 15 cm revealed a grossly ab-
al rectal and sigmoid mucosa with a finely
ular, hemorrhagic pattern, with several large
rs with hemorrhagic bases. Ba enema revealed
iderable ulceration and pseudopolyp formation
just above the cecum to the descending colon;
wallow revealed gross irregularity and ulcera-
in the lower two-thirds of the esophaus,
esting that the esophagitis might be monilial.
hagoscopy showed shallow ulceration of the
hagus, with gross diffuse irregularity and
p formation. Bacteriological examination of
hageal fluid aspirate showed Gram-positive
i in pairs and clumps, with pus cells, but
ure, including a culture on Sabouraud's
um, grew commensals only, and no Candida
cans. The patient was treated with Nystatin
nges 500,000 U 4 times/day, with rapid
ovement of dysphagia; prednisone was gradually
aced by prednisolone disodium phosphate 20
etention enemas once/day, with considerable
ovement in diarrhea. Sigmoidoscopic examina-
1 yr. after discharge revealed a uniformly
ular and hemorrhagic mucosa, compatible with
ulcerative colitis; esophagoscopy showed
iple polyps and papilliferous lesions
ughout the esophagus, with the mucous mem-
e covering these lesions, and between them,
rently normal. This report represents the
t in the British literature of multiple
rations of the esophagus in association with
rative colitis, and describes a possible new
lication of protcocolitis.

1 TREATMENT OF ULCERATIVE COLITIS BY
RESTRICTION OF CARBOHYDRATES. (Ger.)
, W. (St. Julien Strasse 29/1, Salzburg,
ria). Wien. Med. Wschr. 117(25-26):660-662,
.

ents with ulcerative colitis (14 men, 26
n) were treated for an av. period of 13 mo.
on a carbohydrate-poor diet; diagnosis of
disease was made by clinical findings,
oscopy, biopsy and radiology. The patients
ived a diet restricted to 60 g of carbo-
ate/day excluding cereals and cereal products; fat and protein intake was increased to make up the caloric deficit. Of 40 patients, 35 showed definite improvement while 5 were not helped; these 5 underwent antibiotic, sulfonamide and glucocorticoid therapy, and autoimmune studies, as well as carbohydrate restriction. The 35 subjects aided by diet therapy presented definite objective evidence of improvement although some residual damage remained (pain in the abdominal region); bleeding ceased, the color of the mucosa as seen by rectoscopy became normal, blood Fe conc. increased, wt. increased and mood and outlook improved.

11642 FOOD SENSITIZATION IN PATIENTS WITH ULCERATIVE COLITIS AND SPASTIC COLITIS. (Pol.) Romański, B. (1st Intern. Dis. Clin., Danzig, Poland), Z. Jancelewicz and A. Świderska. Pol. Tyg. Lek. 22(22):823-826, 1967.

Antibody determinations against milk, flour and egg white using the passive agglutination method were performed on the sera of 40 patients; 11 with ulcerative and 29 with spastic colitis. High antibody titers against milk were obtained in 65%, against wheat flour in 46% and against egg white in 54%. In 33 patients intestinal symptoms were aggravated by ingestion of these foods and in 19 cases a correlation between high antibody titers and aggravation of symptoms could be demonstrated. Antibody levels did not correlate with the clinical picture and duration of the disease. These high titers in sera of patients with colitis indicate an allergic process but cannot be used for evaluation of disease severity or for prognosis. It was noteworthy that 29 (72.5%) of the patients studied had symptoms of allergies: eczema and urticaria in 17, bronchial and nasal catarrh in 11 and bronchial asthma in 1 patient. It is concluded that sensitization to foods is 1 of the important factors in the etiology and pathogenesis of ulcerative and spastic colitis.

11643 ANTIBIOTIC TREATMENT IN ULCERATIVE COLITIS. EFFECTS ON SMOOTH MUSCLES. (Pol.) Gibiński, K. (3rd Intern. Dis. Clin., Katowice, Poland) and Z. Herman. Pol. Arch. Med. Wewnet. 38(5):583-589, 1967.

Cecal and gastric ulcers were induced in white male Wistar rats of 200-300 g wt. Phenylbutazone in 100 mg/kg amounts was inj. i.p. daily for 6 days in 23 rats while 23 control rats received 0.1 ml/100 g body wt. of 0.9% NaCl soln. The animals were sacrificed after 6 days. All phenylbutazone-treated animals showed ulceration of the cecum and gastric mucosa. The cecum in all animals was suspended in Tyrode's soln. and tension, amplitude, and frequency of contractions were recorded on a kymograph before and after addition of the antibiotics. The contractions of the normal cecum were stimulated by 0.1 mg/ml of chloramphenicol (Chloromycetin) in the Tyrode's soln., were inhibited by 0.25 mg/ml and completely paralyzed by 0.5 mg/ml. Chloramphenicol stimulated ulcerated cecum in 0.1-0.5 mg/ml amount but completely paralyzed it in an amount of 1 mg/ml. Pyrrolidinomethyltetracycline in 0.1-0.25 mg/ml amount did not change peristalsis of the normal cecum, but 0.5 mg/ml caused paralysis. With the ulcerated cecum this drug enhanced peristalsis in 0.1-1 mg/ml amounts but paralyzed them when 2 mg/ml were used. Tetracycline affected the normal cecum in the same way, 0.1 mg/ml inhibited it, and larger amounts paralyzed the ulcerated cecum. Erythromycin had the weakest direct effect on the cecum; in 0.1-2.0 mg/ml conc. it had no effect on normal and ulcerated cecum but at 4.0 mg/ml completely inhibited peristalsis. Routine admin. of antibiotics in ulcerative colitis should be discouraged except in cases of severe complications.

11644 A REVIEW OF THE USE OF TANNIC ACID IN PATIENTS WITH ULCERATIVE COLITIS. (E.)

Janower, M. L. (Massachusetts Gen. Hosp., Boston), L. L. Robbins and D. E. Wenlund. Radiology 89(1):42-43, 1967.

The clinical records of 507 patients who were diagnosed as having ulcerative colitis at the Massachusetts General Hospital during the period of 1944-1960 were reviewed, in retrospect, with the aim of determining the incidence of liver disease as related to Ba enema admin. Of the 104 patients who had had no Ba enema studies, 17 patients had a total of 26 liver function tests with all but one being considered normal. Seven patients with jaundice form an obvious cause (6 from postoperative sepsis and 1 with alcoholic cirrhosis) were omitted. Of the 403 patients with at least 1 Ba enema study, 127 had a total of 223 liver function tests. Of these, 61 patients who had 96 tests before enema had 5 tests which were considered abnormal, while 26 patients with 52 tests within 1 mo. after enema had 8 abnormal tests and 40 patients with 75 tests had 10 abnormal values. Review of the clinical records of these patients with abnormal tests did not show any correlation with admin. of Ba. Those patients whose Ba enemas preceded their jaundice were found to be suffering from metastatic carcinoma (1), infectious hepatitis (2), syndrome of ulcerative colitis, arthritis and hepatitis (2) and postoperative sepsis (10).

11645 THE ROLE OF ALLERGIC AND PSYCHIC FACTORS IN THE PATHOGENESIS OF ULCERATIVE AND SPASTIC COLITIS. (Pol.)

Romański, B. (1st Intern. Dis. Clin, Danzig, Poland), Z. Falicki, and Z. Jancelewicz. Pol. Arch. Med. Wewnet. 38(4):487-493, 1967.

Forty patients (20 males and 20 females) aged 20-67 yr. with large intestinal disturbances of 1-10 yr. duration were subjected to intensive physical, psychiatric and allergologic examinations. The probable precipitating factors among the 11 cases of ulcerative colitis studied were: psychic trauma, 5 cases; inflammation of the ovaries, 1 case; vitamin B_{12} inj., in 1 case. Among the 29 cases of spastic colitis: psychic trauma, 5 cases; severe infectious diseases, 5 cases; dietary indiscretion, 5 cases. In 22 patients infection within the abdominal cavity preceded the onset of the disease. Allergic conditions (determined clinically and immunologically) could be demonstrated in 38 of the 40 patients. Seventeen patients had hives or other skin conditions, 11 sinus or respiratory symptom and 1 had asthma. Positive skin tests could be demonstrated in 25 patients. In many there was a correlation between aggravation of symptoms by certain foods and a high level of reagins to these foods in their blood. Psychic disturbance were noted in 38 cases (14 had hysterical syndromes, 9 neurasthenia, 10 mixed syndromes and 5 other symptoms). In 22 patients the psychiatric syndromes existed before the onset of colitis, in 13 they accompanied the somatic symptoms, and in 3 cases appeared after the onse of the disease. Sexual disturbances were noted in 15 patients. It is concluded that infectious allergic, psychic and sexual factors play a role in the pathogenesis of colitis. A possible mechanism of action of these factors in causing the disease is briefly discussed. It is recomme that treatment should be based on cooperation between internist and psychiatrist.

11646 EARLY SURGERY IN THE MANAGEMENT OF SEVERE ULCERATIVE COLITIS. (E.)

Goligher, J. C. (Gen. Infirm., Leeds, England), F. T. De Dombal, N. G. Graham and G. Watkinson. Brit. Med. J. 3(5559):193-195, 1967.

Of the 74 patients who were treated for severe attacks of ulcerative colitis, 43 were treated by early surgery after failure to respond to intense, conservative therapy. The patient age distribution relative to the time of severe attack was 12 (0-19 yr.), 35 (20-39 yr.), 25 (40-59 yr.) and 9 (60 yr. and over). The types of surgery employed were proctocolectomy and ileostomy (40 patients), colectomy and ileostomy (1 patient), rectal excision and ileostomy (1 patient), and laparotomy and subsequent closure (1 patient). Initial medical therapy usually included large systemic doses of corticosteroids often combined with salazosulfapyridine. ACTH inj. (max. of 100 U/day) were also given to some patients. There was also a need for replacement therapy at times. Indications for early surgery included persistent massive hemorrhage or signs of perforation; sudden deterioration in the general health of a patient; no response to conservative therapy in patients over 60 yr. of age, and failure of significant improvement in younger patients after 4-5 days of intense medical therapy. There was only 1 death which occurred

29-yr.-old man who succumbed postoperatively
he effects of liver cirrhosis; this yielded
t mortality rate of 1.3% for all patients
ied, a significantly lower-rate than that for
previous decade (11.3% during the 1952-63
od). Of the 4 patients over 60 yr. of age
were operated upon, none died as a result of
ery as compared to the 50% death rate during
1952-1963 period.

7 A SOCIO-ECONOMIC STUDY OF PATIENTS WITH
ULCERATIVE COLITIS. (E.) Bonnevie, O.
tofte Hosp., Copenhagen). Scand. J. Gastroent.
:129-136, 1967.

naterial comprised 222 patients with ulcera-
colitis, who on admission to the hospital
ng the 5-yr. period 1960-1965 were permanent
dents in the county district of Copenhagen or
nunicipality of Gentofte, Denmark, the
ation of which was used as control material.
naterial was subdivided into 21 socio-economic
s. Among the patient population, 61.1% of
cases of ulcerative colitis occurred in men
20-50 yr., and 83.3% in women aged 20-60
the ratio of women to men was 1.5:1. In
control material, where this ratio was 1:1,
were children under the age of 14, against
among the patients. It was shown with
stical significance that within the 2
-economic subgroups "civil-servants +
ied grades", and "wage-earners", the patients
found at a relatively higher educational
conomic level. The distribution among the
socio-economic groups was the same as in
control material.

ULCERATIVE COLITIS IN CHILDREN.
REASSESSMENT OF A DILEMMA. (E.)
mott, J. F., Jr. (U. Michigan Med. Sch.,
rbor) and S. M. Finch. J. Amer. Acad. Child.
iat. 6(3):512-525, 1967.

ficant emotional illness was found to be
iated with the occurrence of ulcerative
is in a series of 49 children (26 boys. 23
; 2-16 yr. old) studied over a 10-yr. period.
e 26 boys, 11 had predominantly personality
ders, either passive-aggressive or passive-
dent, 8 had predominantly compulsive
nality types and 6 were of a mixed type. Of
3 girls, 11 had relatively typical compulsive
nalities, 2 had a passive-aggressive
nality disorder, and 9 had a relatively
mixture of compulsivity and such infantile
s as dependence and passive-aggressive
ior. Diagnosis was deferred in 2, a boy
girl, who were 2 and 3 yr. old, resp. Of
o received the most intensive psychiatric
ement (inpatient care), there were 16 boys
girls, ranging from 6-15 yr. old; the
n of hospitalization varied from 5-36 mo.,
an av. of 14 mo. Psychological improvement
oted in all but 4 patients treated
sively, 2 of whom died; 18 of 24 (75%)
treated intensively required subtotal colectomy with ileostomy as part of their total management. Although significant improvement in the emotional states was noted in the majority of the patients treated, this improvement was not associated with reversal or parallel improvement in the intestinal disease, confirming impressions that other etiological factors play a role in maintaining the progression of the disease. A pilot study in which serial samples of 2 of the patients' lymphocytes were mixed with normal colon cells demonstrated a persistent state of altered immunity over a period of 6 mo., in spite of changes in the emotional functioning and in the clinical expression of the disease.

11649 PSYCHIATRIC STUDY OF A CONSECUTIVE SERIES OF 34 PATIENTS WITH ULCERATIVE COLITIS. (E.) Feldman, F. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.), D. Cantor, S. Soll and W. Bachrach. Brit. Med. J. 3(5556):14-17, 1967.

Each of 34 patients (17 male, 17 female) with ulcerative colitis who were studied psychiatrically first had 2 standard psychiatric interviews of the free-association type which eventually included a discussion of sufficient current and past material to yield data for scoring approx. 65 variables considered salient for personality evaluation. The minimum amount of time spent with and discussing each patient was 5-6 hr., and the av. was 10-12 hr. Two types of control groups were used; the first consisted of the general population, divided into normal and abnormal according to arbitarary criteria, and the second group comprised the first 74 patients admitted to the gastroenterology service while this study was in progress. No patients with large-intestine disease or regional enteritis were included. Of the 34 patients, 29 were regarded as essentially normal and 5 as abnormal; the latter included 1 or more of the following character disorders to a significant degree: indequate, infantile, passive, schizoid, depressive or dependent. There were among the normal personalities mild to moderate personality characteristics in this incidence: passive-dependent, 8; passive-aggressive, 5; and anxious, 1. Fifteen were classed as predominantly normal, i.e., to have no or very mild character disorders. There was 1 psychopathic personality who was also diagnosed as schizoid. In only 4 of 34 cases was a significant precipitating factor thought to have occurred close in time to the first attack of ulcerative colitis; in 3 cases there was a possible substantial emotional conflict. In 15 cases a moderately eventful emotional factor was present within 6 mo. of a relapse of the disease, but not before its first occurrence. In only 5 instances was a moderate-to-severe degree of stress present before the onset of the first attack of ulcerative colitis. In 9 cases a moderate-to-moderately-severe degree of stress was present before a relapse. In 14 cases, the total background, or dynamic, factors were such as to suggest the possibility of nuclear conflicts that might express themselves in somatic illness; in no case was it felt that any of the possible nuclear conflicts showed a demonstrable symbolic relation to the ulcerative colitis. No alternation of either psychiatric or physical symptoms with the ulcerative colitis was encountered in the patients' history or in their hospital course. Headaches were a complaint in 6 cases, but without significant reference to the severity of the ulcerative colitis. Mild-to-moderate depression was present in 4 cases, but there was no alternation with the symptoms of colitis. Of the 34 patients, 7 had undergone fairly extensive psychiatric treatment lasting from several mo. to 8 yr.; in 3 cases it aided the patients' adjustment to the disease, but in none did it have an appreciable effect on the course of the disease. In general, control patients showed as much psychopathology as, or more than, the ulcerative colitis patients. This series of 34 is thought to be the first in which a relatively large, consecutive and unselected group of cases has been studied by the same team, using the same methods, planned in advance.

11650 CRYTOGENETIC ULCERATIVE COLITIS AND HEMORRHAGIC RECTOCOLITIS. (Fr.) Busson, A. and J. Chomé. Arch. Mal. Appar. Dig. 56(6):563-567, 1967.

Of 78 patients, 9 had primary ulcerative cryptogenetic colitis, 64 had hemorrhagic rectocolitis (ulcerative colitis) and 5 had mixed forms. Ulcerative cryptogenetic colitis evolves in 1 or more attacks with these symptoms: a liquid diarrhea becoming purulent in 2 or 3 wk. in the absence of pathogenic bacteria; sharp abdominal pain; a variable fever occurring after some days or wk., very little bleeding; the rectum is little affected while ulcerations begin in the sigmoid and radiology reveals deep irregular folds usually in 1 segment of the colon, the site of ulceration. As the disease progresses the radiologic picture resembles that of hemorrhagic rectocolitis which arises in 1 or multiple attacks reaching the stage of irreversible lesions, the ulcerations having a spongy, striped appearance with loss of definite boundaries. Rectosigmoidoscopy showed identical lesions in the rectum (when they are present) and in the sigmoid. The mucosa is replaced by superficial ulceration or is abraded deeper than the muscularis mucosae, is marked by longitudinal bands of hemorrhagic swelling, is studded with swollen regions giving the illusion of polyps and is normal in appearance where the first 3 conditions are absent. Histologically, submucosal changes take place prior to mucosal alterations in cryptogenetic ulcerative colitis; submucosal capillaries become intensely dilated, the mucosa, congested with edema and inflammatory granulation tissue, separates from the vascular-nervous layer; extravasation of blood occurs. The desquamated regions become ulcerated. Hemorrhagic infarction, which causes death of epithelial cells is preceded by a mucous secretion due to irritation resulting in mucous abrasion (mucohemorrhagic rectocolitis) later becoming hemorrhagic rectocolitis or primary eryptogenetic ulcerative colitis. It is concluded that these are merely 2 clinical forms of the same disease, the neurovascular, physiopathological processes and reactions being identical.

11651 ULCERATIVE COLITIS. (Ger.)(Rev.) Kühn, H. A. (Justus Liebig U., Giessen, Germany) and E. Nägele. Ergebn. Inn. Med. Kinderheilk. 25:165-267, 1967.

11652 A REVIEW OF ULCERATIVE COLITIS. (E.) (Rev.) Weinberg, B. J. (Michael Reese Hosp., Chicago, Ill.). J. Pakistan Med. Ass. 17(2):41-49, 1967.

11653 ARTHRITIS IN ULCERATIVE COLITIS. (Ser. Mikloušić, M. (Fac. Intern. Med., Zagreb, Yugoslavia), T. Dürrigl and S. Čerlek. Lijecn. Vjesn. 89(2):161-165, 1967.

11654 ULCERATIVE COLITIS. (Nor.) Harbitz, T. B. T. Norsk. Laegeforen. 87(16): 1334-1336, 1967.

11655 FUNCTIONAL STATE OF THE LIVER IN NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Il'khamov, A. I. (Uzbek Inst. Reg. Med., Tashkent, USSR), T. D. Guliamov and V. E. Nazyrova. Med. Zh. Uzbek. (5):42-44, 1967.

11656 EXPERIENCE AND METHODS OF PREVENTIVE TREATMENT IN GASTRODUODENAL ULCER. (Rus.) Men'shikov, F. K. (Cent. Inst. Postgrad. Med., Moscow). Ter. Arkh. 39(8):62-65, 1967.

11657 CLINICAL AND IMMUNOLOGICAL STUDIES IN NONSPECIFIC ULCERATIVE COLITIS AND OTHER CHRONIC DISEASES OF THE INTESTINE. (Rus.) Makievskaia, S. E. (Vladimir Moscow Reg. Sci. Res. Inst.) and I. S. Atserova. Ter. Arkh. 39(8):68-71, 1967.

11658 RESISTANCE TO ANTIBIOTICS OF DIFFERENT STRAINS OF *Escherichia coli* TAKEN FROM PATIENTS WITH CHRONIC NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Il'khamov, A. I. (Uzbek Inst. Reg. Med., Tashkent, USSR), B. F. Kadyrov and T. D. Guliamov. Med. Zh. Uzbek. (6):37-38, 1967.

11659 PHLEGMASIA CERULEA DOLENS AND ULCERATIVE COLITIS. REPORT OF CASE. (E.) Woolling, K. R. (Marion County Gen. Hosp., napolis, Ind.), K. Lawrance and B. D. ak. Angiology 18(9):556-564, 1967.

TREATMENT OF PATIENTS WITH CHRONIC NONINFECTIOUS COLITIS WITH CHRONIC IPATION. (Rus.) Levitan, M. Kh., O. P. , I. M. Tovbin, V. F. Smirnov and I. R. dzhieva. Pp. 224-231 in Diseases of the Intestine and Rectum. (Current Problems in ology). Vol. 4, Ryzhikh, A. N. (Ed.) w, Ministry of Health, RSFSR, 1966, 387pp.

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DIFFERENTIAL DIAGNOSIS OF BALANTIDIASIS AND NONSPECIFIC ULCERATIVE COLITIS. Khamtsov, V. G. Pp. 211-214 in Diseases Large Intestine and Rectum. (Current ems in Proctology). Vol. 4, Ryzhikh, A. N. Moscow, Ministry of Health, RSFSR, 1966,

STRUCTURAL CHANGES OF THE INTESTINE AND LIVER IN NONSPECIFIC ULCERATIVE COLITIS FROM LIGHT AND ELECTRON MICROSCOPE STUDIES.). (Rus.) Turchins, M. E., M. P. Sinel'nikova and Kh. M. Veksler. Pp. 205-210 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11665 TREATMENT OF NONSPECIFIC ULCERATIVE COLITIS PATIENTS WITH PREPARATIONS FROM THE LACTOBACILLI. (Rus.) Iukhvidova, Zh. M., M. Kh. Levitan, O. P. Marko, V. F. Smirnov and A. C. Bronshtein. Pp. 199-204 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11666 DYNAMICS OF INTESTINAL MICROFLORA IN CONSERVATIVE TREATMENT OF PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Marko, O. P. Pp. 194-199 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11667 DYNAMICS OF QUANTITATIVE CHARACTERISTICS OF STRAINS OF Escherichia coli OBTAINED FROM PATIENTS WITH NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Kudlai, D. G., V. G. Petrovskaia, N. B. Davydova, O. P. Marko and T. K. Korneva. Pp. 190-194 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol. 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11668 CLASSIFICATION OF NONSPECIFIC ULCERATIVE COLITIS (ANALYSIS OF 253 CASES). (Rus.) Iukhvidova, Zh. M. Pp. 185-190 in Diseases of the Large Intestine and Rectum. (Current Problems in Proctology). Vol, 4, Ryzhikh, A. N. (Ed.) Moscow, Ministry of Health, RSFSR, 1966, 387pp.

11669 PANCREATOGRAPHY BY MEANS OF INTRAVENOUS ERYTHROSINE B IN CLINICAL USE. A STUDY OF THE FIRST THIRTY CASES. (Fr.) Ledoux-Lebard, G. (Fac. Med. Radiol., Paris), F. Heitz, A. Béhar, J. Rosier, L. Leger, F. Siguier and M. Prémont. J. Radiol. Electr. 48(6-7):373-378, 1967.

With this new technic the patient undergoes no more than a pneumoretroperitoneum and a pneumoperitoneum. Standard X-ray films and tomographs of face and profile are taken for reference before i.v. inj. of contrast medium; 20-30 ml of 10% erythrosine B are inj. and tomographs are taken in the same planes as the reference films, 20, 40, and 70 min. after inj. The opacity becomes apparent at 20 min., increases up to 40 min. and is attenuated or has disappeared at 70 min. The time can be determined when the differentiation in the pancreas is best as the contrast material passes into the duodenum or jejunum. Control films taken 24 hr. later as a rule show the gallbladder clearly outlined and having a slight opacity. The films taken at 40 min. usually have the clearest pictures. In the face exposure the pancreas has the form of an opaque racket, the large end latero-vertebral toward the right passing the left lateral edge of the vertebral column. This opacity is as a rule oblique below, on the right, and covers the region of the head and body of the pancreas; little of the tail is visible in this view. In profile a prevertebral opacity regularly appears in front of the prerenal border, oblique at the base and in front; here, a picture can be taken, if needed, of the head, body, or tail of the gland. If a film is taken of the long axis, with a slight modification of the face exposure, (without increase of the oblique dimension) the image of the gland shows as a prevertebral shadow, strictly vertical and in the form of a half-moon. Diagnosis of pathological conditions such as chronic pancreatitis, with and without calculi, and other morbid states can be made with this method.

11670 NORMAL DUODENAL TRYPSIN VALUES IN RESPONSE TO SECRETIN-PANCREOZYMIN STIMULATION WITH PRELIMINARY DATA IN PATIENTS WITH PANCREATIC DISEASE. (E.) Choi, H. J. (Jefferson Med. Coll., Philadelphia, Pa.), F. Goldstein, C. W. Wirts and H. Menduke. Gastroenterology 53(3): 397-402, 1967.

Pancreatic function tests were performed by analysis of duodenal-pancreatic aspirates after stimulation of the pancreas with secretin (1 clinical U/kg) and pancreazymin-cholecystokinin (75 Ivy dog U, admin. i.v.); 20 hospitalized patients (12 men, 8 women; 22-77 yr. old) without evidence of pancreatic or other organic gastrointestinal disease were used as controls; 12 patients with chronic pancreatic disease (9 [7 men, 2 women; 30-73 yr. old] with chronic or relapsing pancreatitis, 3 [1 male, 2 female; 49-69 yr. old] with carcinoma of the pancreas) were studied for comparison. Values for enzymes in normal controls after pancreozymin-cholecystokinin stimulation were as follows: trypsin, max. conc. 22.6-66.8 (mean 42.2) mg/100 ml; amylase, max. conc. 353-4457 (mean 1413) U/ml; and lipase, max. conc. 15.1-25.4 (mean 20.9) U/ml. In normals, 60-min. secretion after admin. of secretin yielded vol. of secretion of 75-339 (mean 181) ml, and bicarbonate, max. conc. 63-121.5 (mean 91) mEq/lit Among patients with chronic pancreatic disease, the mean values for bicarbonate, trypsin, lipase and amylase output were significantly lower than those of the normal group; the mean of the vol. measurements was also significantly diminished for the entire group, but was less so if the pancreatitis patients were analyzed separately from the carcinoma group. The vol. of flow show no diagnostic significance in individual patient with pancreatitis, since all but 1 patient had normal vol. of secretion. However, 2 of 3 patie with carcinoma had low vol. of secretion. It is suggested that measurements of trypsin, or of other pancreatic enzymes (amylase or lipase) may add to the accuracy and sensitivity of the secretin-pancreozymin test of pancreatic function; in view of the comparative ease and accuracy with which trypsin can be measured, it is suggested that trypsin determinations be used in clinical tests of pancreatic function, in addition to the conventional vol. and bicarbonate measurements.

11671 MEASUREMENT OF TRYPTIC ACTIVITY IN INTESTINAL JUICE AS A DIAGNOSTIC TEST OF PANCREATIC DISEASE. (E.) Cook, H. B. (Cent. Middlesex Hosp., London), J. E. Lennard-Jones, S. M. Sherif and H. S. Wiggins. Gut 8(4):408-41 1967.

The conc. of trypsin in duodenal juice, collecte by siphonage using a single-lumen tube for 4 consecutive half-hr. periods after a standardize (Lundh) test meal (containing 6% fat, 5% protein and 15% carbohydrate), was used as an index of exocrine pancreatic function. A titrimetric method was used, measuring the rate at which H ion is liberated from a substrate. The lowest coefficients of variation were found in the peak 30-min. tryptic activity and the mean 2-hr. tryptic activity after the test meal; the mean tryptic activity was the more useful measurement since it required only a single enzyme determination. The lower limit of normal using this measurement (derived from tests on 44 subjects) was found to be 9.6 µEq/min./ml. Patients presenting with pain were divided into 3 groups; those with no evidence of pancreatic disease (19 yielded no result below the lower limit of norma of 13 with possible pancreatic disease, 3 had low results (2, 8 and 8.5 µEq/min./ml). A total of 25 had proven pancreatic disease; the first 12 were studied 2 days-6 mo. after acute pancreatitis, and an abnormal result was found in only 3; an abnormal (low) result was found in 11 of the last 13 with chronic pancreatic disease. Of 16 patients with obstructive jaundice, the

tryptic activity was low in 5 of 7 who had
er of either the pancreas or ampulla of Vater;
as decreased in only 3 of 9 patients who had
ancreatic jaundice, and 2 of these had chole-
olithiasis. Patients with steatorrhea fell
4 groups; 14 of 15 with pancreatic steator-
had low mean tryptic activities; 2 with
inger-Ellison syndrome had low values (3.0
5.0 μEq/min./ml). Of 10 with nonpancreatic
torrhea, mean tryptic activity was below the
al range in 4, while in 7 patients who had
rectomy, values were extremely low in 3, and
of these, there was evidence of pancreatic
ase. This test was particularly useful in
diagnosis of pancreatic steatorrhea; the re-
s also suggest that steatorrhea occurs in
reatic disease only when the conc. of enzymes
uodenal juice falls to very low levels.

2 THE IMPORTANCE OF THE ACTIVATION AND
INACTIVATION OF PROTEOLYTIC ENZYMES FOR
IEASUREMENT OF PANCREATIC FUNCTION. (Ger.)
er-Wieland, K. (U. Hamburg, Germany) and W.
dt. Z. Gastroent. 5(4):234-238, 1967.

sin, chymotrypsin and carboxypeptidase-A conc.
determined in duodenal fluid collected in a
n. period following slow or rapid i.v. inj.
ecretin or pancreozymin. Individuals with
l pancreatic function and patients with
en pancreatic exocrine insufficiency were
ed. The values for these enzymes among
l persons did not show a distribution ac-
ng to the binomial bell curve but followed a
ithmic distribution. Patients with exocrine
fficiency showed values of only 20% of normal.
roteases were rapidly digested with or with-
he presence of Ca ions in the duodenal fluid.
ypsin inhibitors were found in the fluid.
assumed that lyosomal proteases of the in-
nal epithelium are able to hydrolyze exocrine
eatic enzymes; these cathepsins are relatively
rature-stable and are active in a pH range
7. Testing of the enzyme activity in the
nal fluid for diagnostic purposes should
re the initial reaction velocity.

3 THE TESTING OF THE PANCREAS FUNCTION
BY MEANS OF THE GLYCERINE-$^{14}C_1$ TRI-
TATE TEST. (Ger.) Uthgenannt, H. (1st Med.
, Lubeck, Germany), U. Ritter and L. Hesse.
stroent. 5(3):169-177, 1967.

rine-$^{14}C_1$-tripalmitate (20 μc/20 ml of milk)
ntubated into the duodenum of 82 patients of
30 had normal pancreas and digestive tract,
d pancreatopathies, 10 diabetes mellitus,
0 had chronic gastritis. To obtain max.
eatic exocrine secretion 0.1 mg/kg of metha-
ne s.c. and then 1.7 U pancreozymin or 1.0
retin or both as a double stimulant, were
. The intraduodenal admin. of 40 U of lipase
a second test dose of radioactive tripalmitate
e used to test absorption of fat. $^{14}CO_2$ and
ere determined in a continually-recording analyzer, CO_2 being measured by infrared absorption spectrum and the radioactivity being measured in a gas counting chamber. All calculations required are explained. The first radioactive CO_2 expired appeared between 8 and 30 min. after duodenal intubation of the test dosage. In the time interval of 60 min. and an arbitrary specific activity of 1.0 set up for the amount of exhaled radioactive CO_2, all except 3 of the 30 normal subjects attained the specific activity of 1 within 60 min.; the 3 false negatives have not been explained. Of 10 patients with pancreatic disease, (chiefly chronic pancreatitis) 9 did not show the specific activity of 1 within 60 min. and there was 1 false negative. All 10 patients with diabetes mellitus presented low specific activities. All except 1 of 10 patients with chronic gastritis showed very low values for specific activity, the other was false positive.

11674 INTRADUODENAL PRESSURES IN PATIENTS WITH BILIARY AND PANCREATIC DISEASE. (E.) Anderson, M. C. (Northwestern U. Med. Sch., Chicago, Ill.). Pacif. Med. Surg. 75(4):217-223, 1967.

Intraduodenal pressure measurements were performed in 15 patients, including 2 (1 of each sex, 50 and 58 yr. old) with no evidence of intra-abdominal disease, 6 (all female, 37-67 yr. old) with chronic biliary tract disease (5 with chronic cholecystitis, 1 of whom had a common bile duct stone, and 1 with a cystic duct remnant) and 7 (6 men, 1 woman; 28-48 yr. old) with chronic pancreatitis (in 6 of whom it was associated with excessive alcohol ingestion). Pressures were determined in the resting state, after increased intra-abdominal pressure, and after instillation of saline, dilute acid, and alkali. In normal patients, duodenal pressures increased rapidly after instillation of acid but returned to normal promptly after addition of the alkali. Patients with biliary tract disease responded in a manner similar to the controls (normal patients), except for the development of symptoms which were similar to those experienced during an attack. Patients with chronic pancreatitis exhibited marked and prolonged hypertonicity after instillation of acid into the duodenum which responded slowly to neutralization with alkali. This increased duodenal tone was accompanied by symptoms which accurately reproduced previous attacks of pancreatitis. These findings indicate that duodenal tone is increased during pancreatitis; whether this is a cause or an effect of pancreatitis remains to be elucidated.

11675 THE STRUCTURE OF TAMM-HORSFALL MUCOPROTEIN IN FIBROCYSTIC DISEASE. (E.) Friedmann, T. (NIH, Bethesda, Md.) and P. Johnson. J. Lab. Clin. Med. 70(3):404-407, 1967.

Tamm-Horsfall mucoprotein was examined by means of ultracentrifugation, starch-gel electrophoresis, end-group analysis, peptide mapping, immunodiffusion and hemagglutination. It was not possible to detect any differences in the structure of Tamm-Horsfall mucoprotein isolated from patients with mucoviscidosis compared to that from control children. Both forms were examined in the electron microscope by the method of negative staining, and their ultrastructures were not distinguishable by this technic. These results do not support the conclusion that the Tamm-Horsfall mucoprotein is abnormal in structure in mucoviscidosis. These findings are also thought to constitute strong evidence against a structural gene mutation of the protein moiety of this mucoprotein as the basis for the proposed abnormality in mucoviscidosis.

11676 STUDIES OF THE FUNCTION OF THE SWEAT GLAND, PAROTID GLAND AND THE PANCREAS IN CHRONIC BRONCHITIS AND HETEROZYGOUS MUCOVISCIDOSIS OR CYSTIC FIBROSIS. (E.) Toivonen, S. (U. Helsinki). Ann. Med. Intern. Fenn. 56(Suppl. 50):9-48, 1967.

The function of the sweat gland, the parotid gland and the pancreas were studied in 225 patients with chronic bronchitis (171 men, 54 women; 16-81 yr. old), in the parents (10) of mucoviscidotic children (definite heterozygotes), and in 126 normal controls (68 men, 58 women; 16-74 yr. old). In the sweat tests, electrolyte values higher than the normal limit (Cl conc. equal to or greater than 60 mEq/liter, Na conc. equal to or greater than 80 mEq/liter were found in 46 of 225 (20.4%) bronchitics; 4 of 126 (3.5%) normal controls had values above this limit and the difference was statistically significant. Three of 10 parents of mucoviscidotic children had above-normal values. Sex, age, and smoking had no significant effect on the findings. The sweat test was a poor heterozygote test since it revealed only a part of the heterozygotes; the i.v. aldosterone test did not improve the screening of heterozygotes. There were no significant differences between the groups in the parotid gland studies. The studies of pancreatic function, however, revealed significant findings for tryptic enzymes. The trypsin conc. in the duodenal aspirate produced by secretin stimulation was significantly lowered statistically in the parents of mucoviscidotic children; their total trypsin output and that of the bronchitic patients with high sweat electrolytes was also reduced compared with the control groups. The parents of mucoviscidotic children and bronchitics with high sweat electrolytes differed statistically from the normal control group with functional gastrointestinal complaints in the chymotrypsin control in both the conc. and total output values of duodenal aspirate. The parents of children with mucoviscidosis differed more sharply from the other groups in the fecal trypsin conc. studies, but bronchitic patients with high sweat electrolytes also had a statistically significant difference from the comparative group of bronchitics with low sweat electrolytes. No significant differences in the fecal chymotrypsin conc. were established between the adequate groups. In a comparison of all the positive findings in the sweat gland tests and parotid gland and pancreatic function studies, 3 or more positive findings out of a possible total of 9 were obtained in 9 of 10 definite heterozygotes, 14 of 19 chronic bronchitics with high sweat electrolyte values and 2 of 13 chronic bronchitics with low electroly values, and none in the patients with functional gastrointestinal complaints (normal controls). The statistically highly significant correlation obtained between the chymotrypsin conc. of duodena aspirate and stools was of general importance for adaptation of the fecal chymotrypsin determination as a screening test of pancreatic function. The correlation for trypsin was poorer, but also significant. The results for the parents of mucoviscidotic children suggest that the trypsin deficit in both the duodenal aspirate and stools distinguishes the heterozygotes better than the increase in sweat electrolytes. Although this study indicated that heterozygous mucoviscidosis may play a role in some cases of chronic bronchiti longitudinal, clinical, and comprehensive biochemical studies on large groups of definite heterozygotes are necessary for further elucidation of this point.

11677 LONG-TERM RESULTS OF NONPENETRATING PANCREATIC TRAUMA. (E.) Warren, K. W. (Lahey Clin., Boston, Mass.) and R. B. Wagner. Lahey Clin. Found. Bull. 16(2):217-223, 1967.

A follow-up study of 20 patients 2-28 yr. after blunt pancreatic trauma revealed that recurrent pseudocysts, recurrent fistulas, chronic pancreatitis, stenosis of the sphincter of Oddi and duodenal ulcer were frequent long-term complications. In total, 69 operations were performed and 9 patients required surgery for a complicatio of pancreatic trauma more than 1 yr. after the original injury. Each patient experienced at least 1 major complication of pancreatic injury; the development of an inflammatory pseudocyst was the most common (13 patients) and recurrent pseudocysts next (12 cases). The latter redeveloped after spontaneous closure of a previous internal drainage procedure in 4 cases and from unsuccessful treatment by marsupialization in 3 others. Chronic pancreatitis developed in 8 patients and 2 others had symptoms suggestive of pancreatitis. All had undergone surgery for either a pseudocyst or fistula. The interval between the trauma and chronic pancreatitis surgery ranged from 37 days to 18 yr. Some form of pancreatic resection was eventually performed in 9 cases with good or excellent results in 7 after 16 mo.-16 yr. follow-u Duodenal ulcers and intestinal obstruction each developed in 3 cases.

11678 COMPARISON OF PSYCHIATRIC SYMPTOMS IN CARCINOMA OF THE PANCREAS WITH THOSE IN SOME OTHER INTRA-ABDOMINAL NEOPLASMS. (E.) Fras I. (Mayo Clin., Rochester, Minn.), E. M. Litin and J. S. Pearson. Amer. J. Psychiat. 123(12): 1553-1562, 1967.

isefulness of psychiatric symptoms in permit-
an early diagnosis of cancer of the pancreas
eported in which 139 patients with either
ct or diagnosed cancer of the pancreas or of
olon were evaluated psychiatrically as soon
ychiatric referral was feasible. Assessment
ved psychological interviewing with special
sis on free-association response by the
nt, a general medical and psychiatric history,
ompletion of the Minnesota Multiphasic Per-
ity Inventory in most cases. Of these pa-
s, 46 were shown to have pancreatic carcinoma
4 to have cancer of the colon (control group),
the remaining patients (19) with other ill-
s formed a mixed control group. The Depres-
Rating Scale value was higher in patients
ring from pancreatic cancer. In all, 76% of
atients with proven pancreatic cancer evinced
ite psychiatric symptoms. Anxiety and
nition of serious illness were frequently
iated with the depression. Loss of ambition
stinguished from physical fatigue and a hard-
scribe "sadness" were also prevalent char-
istics. Similar findings, with the excep-
of premonition, were noted in 3 of 4 patients
proven retroperitoneal malignant lymphoma.
emaining control patients manifested a low
ence of disease-related psychiatric symptoms.
se the psychiatric symptoms appeared before
ther symptoms in almost half of the patients
pancreatic carcinoma, it is felt that initial
iatric evaluation in suspect cases of pan-
ic carcinoma may assist in differential diag-
.

POSTOPERATIVE COMPLICATION OF THE PANCREAS AFTER STOMACH RESECTION. (Ger.)
ler, S. (Free U. Berlin), R. Häring and M.
chel. Med. Klin. 62(37):1428-1431, 1967.

PANCREATIC REACTIONS TO BILIARY AND GASTRIC SURGERY. (Fr.) Maestracci, P.
. Branet. Ann. Anesth. Franc. 8(2):531-536,

EXOCRINE PANCREATIC FUNCTION IN CARCINOMA OF THE PANCREAS. (E.) Bock, O. A. A.
ape Town, South Africa), S. Bank, I. N. Marks
. H. Louw. S. Afr. Med. J. 41(30):754-756,

FUNCTIONAL STATE OF THE PANCREAS IN MYOCARDIAL INFARCTION. (Rus.) Orlov,
(Reg. Clin. Hosp. No. 64, Moscow). Ter.
39(7):78-81, 1967.

EXOCRINE PANCREATIC FUNCTION IN DIABETES MELLITUS. (E.) Bock, O. A. A.
e Schuur Hosp., Cape Town, South Africa),
nk, I. N. Marks and W. P. U. Jackson. S.
led. J. 41(30):756-759, 1967.

11684 INCIDENCE OF DISEASES OF THE PANCREAS IN ACUTE CHOLECYSTITIS. (Rus.) Shabanov, A. N. (Sechenov 1st Moscow Med. Inst.), I. S. Savoshchenko, R. I. Titov and V. A. Shaternikov. Klin. Med. (Moskva) 45(8):61-65, 1967.

11685 EXOCRINE PANCREATIC SECRETION IN PULMONARY TUBERCULOSIS PATIENTS. (Rus.) Bril, L. N. (Cent. Inst. Tuberc., Moscow) and R. Sh. Alimov. Med. Zh. Uzbek. (6):19-22, 1967.

11686 EXPERIMENTAL OPERATIVE PANCREATOGRAPHY AND PATHOLOGY OF THE PANCREATIC DUCTS. (Rus.) Zarzar, A. S. Med. Zh. Uzbek. (6):38-43, 1967.

11687 FACTORS AFFECTING THE SURVIVAL OF ORGAN CULTURES OF THE MAMMALIAN PANCREAS. (E.) Jones, R. O. (Radiobiol. Res. Unit, Harwell, England). Exp. Cell Res. 47(1-2):403-407, 1967.

11688 THE POTENCY OF PERORAL PANCREATIN PREPARATIONS. (Cz.) Libický, A. and B. Svobodová. Cesk. Farm. 16(2):79-85, 1967.

11689 ABNORMAL SERUM FACTOR IN PATIENTS WITH CYSTIC FIBROSIS OF THE PANCREAS. (E.) Spock, A. (Duke U. Med. Ctr., Durham, N. C.), H. M. C. Heick, H. Cress and W. S. Logan. Pediat. Res. 1(3):173-177, 1967.

11690 PANCREATIC CYSTS. (Pol.) Grundman, J. (Inst. Thorax Surg., Warsaw) and Z. Bednarski. Pol. Przegl. Chir. 39(7):657-661, 1967.

11691 THE PATHOLOGY OF Clonorchis sinensis INFESTATION OF THE PANCREAS. (E.) Chan, P. H. (Hong Kong Govt. Inst. Path.) and T. B. Teoh. J. Path. Bact. 93(1):185-189, 1967.

11692 VISUALIZATION OF THE DUCT OF WIRSUNG DURING PEROPERATIVE CHOLANGIOGRAPHY. (It.) Boltri, F. F. (U. Turin, Italy), A. Bologna and U. Boario. Minerva Chir. 22(15):843-849, 1967.

11693 ISOTOPIC EXPLORATION OF THE PANCREAS BY SELENOMETHIONINE. 60 CASES. (Fr.) Swyngedauw, J. (Lambret Ctr., Lille, France), A. Tacquet, P. Foissac-Gégoux and M. Huart. Lille Med. 12(7):773-782, 1967.

11694 STUDIES ON PANCREATIC SCANNING BY MEANS OF ^{75}Se-SELENOMETHIONINE. (Jap.)

Mizukami, T. (Kurume U. Sch. Med., Japan). Nippon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiol.) 26(10):1299-1313, 1966.

11695 EXPERIENCES IN PANCREAS SCANNING USING ^{75}Se-SELENOMETHIONINE. (E.) Centi Colella, A. (U. Rome) and F. Pigorini. Brit. J. Radiol. 40(477):662-669, 1967.

11696 HETEROTOPIC PANCREATIC TISSUE. RADIOLOG ASPECTS. (It.) Monfreda, G. (Inst. Radiol. & Phys. Ther., Venice, Italy), L. Draghi and R. Peloso. Quad. Radiol. 32(3):449-471, 1967

11697 PANCREATIC TRAUMA. (E.) Wilson, R. F. (Wayne State U. Sch. Med., Detroit, Mich.), J. P. Tagett, J. P. Pucelik and A. J. Walt. J. Trauma 7(5):643-651, 1967.

98 EXCISION IN CHRONIC PANCREATITIS. (Fr.)
Mercadier, M. (Charity Hosp., Paris),
P. Clot and P. Camplez. Ann. Chir. 21(11-12):
-644, 1967.

gical management is studied in 71 cases of
onic pancreatitis involving the following 4
cedures: left pancreatectomy (32 cases);
halic pancreatoduodenectomy (21 cases); sub-
al pancreatectomy (15 cases); and repeated
createctomy (3 cases). Pain, vomiting, wt.
s, and difficulties of transit in the diges-
e tract were the chief complaints; these were
cured by surgery. Mortality due to surgery
4% while 93% of the cases were successful as
ven by subsequent examination. Severe dia-
es occurred in no case even with extensive
cedures and when the patient had already been
betic, he could be controlled with small doses
insulin. Excision of sclerosed pancreatic
enchyma is recommended for patients with
onic pancreatitis.

99 PAINLESS FORM OF CHRONIC PANCREATITIS.
(Cz.) Herfort, K. (Fac. Intern. Med.,
gue), M. Keclik and Z. Sivanova. Cesk.
troent. Vyz. 21(2):74-80, 1967.

r patients are described with the painless
m of chronic pancreatitis. These were sup-
mented with 43 patients reported in the
erature to make a group of 47, in which the
quency, sex incidence, etiological factors
clinical manifestations were evaluated and
pared with the results in 714 patients with
onic relapsing pancreatitis. The painless
m of chronic pancreatitis was found to be
atively rare, and predominates in men. With
ard to etiology, the same factors participate
development of this form as in chronic relaps-
pancreatitis; only the incidence of individual
tors was found to vary. The most frequent
m was idiopathic and alcoholic pancreatitis,
the biliary form was relatively rare. In the
ge when the painless form was fully developed
h regard to clinical manifestations, the
ncipal signs were steatorrhea, pancreatic
cifications and diabetes in various combina-
ns. In the group of patients studied, the
comitant incidence of all 3 chief signs, and
combination steatorrhea: pancreatic calci-
ation, were most frequent. The presence of
ign, steatorrhea, was less frequent in the
ge when the painless form is usually diag-
ed. With present knowledge, it is difficult
decide unequivocally whether the chronic re-
sing form and painless form of pancreatitis
etiologically 2 different types or the same
e of chronic pancreatitis which differs only
to clinical manifestations of the disease.

700 URINARY ISOAMYLASES IN THE DIAGNOSIS
OF CHRONIC PANCREATITIS. (E.) Aw, S. E.
(Roy. Postgrad. Med. Sch., London), J. R. Hobbs
and I. D. P. Wootton. Gut 8(4):402-407, 1967.

A simple method is described for the electrophoretic separation of urinary pancreatic and salivary isoenzymes of α-amylase, which offers a convenient screening test for exocrine pancreatic deficiency. Urine specimens (24-hr.) were taken from 3 groups of subjects: Group 1, 29 patients with no history or other evidence of exocrine pancreatic disease, and 5 normal subjects; Group 2, 7 cases of chronic pancreatitis and 1 patient who had total pancreatectomy for pancreatic carcinoma; and Group 3, 4 patients with diarrhea of small intestinal origin, including 3 with radiological evidence of regional enteritis, 1 patient with intestinal alactasia and 1 with gross steatorrhea who also had diabetes mellitus. None of the members of the groups had overt kidney or liver dysfunction. In Group 2, 7 of 8 patients had abnormal zymograms and low ratios, characterized by a decrease of pancreatic amylase activity in relation to the salivary amylase. The urine of patients from Groups 1 and 3 showed a preponderance of pancreatic over the salivary enzyme. The ratio of the amounts of pancreatic to salivary isoamylases in the urine is thus proposed as an index of deficient exocrine pancreatic function, and it is concluded that visual assessment of the urinary zymogram is often sufficient for a diagnosis.

11701 ACUTE RENAL FAILURE IN PANCREATITIS.
(Ger.) Creutzfeldt, W. (U. Clin.
Gottingen, Germany), F. Scheler, E. Quellhorst
and H. Schmidt. Arch. Klin. Med. 213(3):197-
218, 1967.

Of 300 patients treated for renal failure, 14 had renal disease ascribed to pancreatitis; 7 of these 14 died of acute renal failure. Seven additional cases of acute pancreatitis were discovered among 26 with acute renal disease despite the lower incidence of kidney conditions in the last few yr. In 8 patients there were no characteristic symptoms of pancreatitis at the onset of renal failure; elevated serum aymlase was found in 4; this elevation usually decreased with progression of the disease; elevation of urine amylase was never noted after onset of the acute kidney condition. Transient hyperglycemia occurred in 5 patients. In 9 of 10 patients the serum Ca conc. decreased at onset of acute renal failure; hypocalcemia was most marked in those patients who died. In 4 cases the diagnosis was made at autopsy. A pancreatic pseudocyst developed in 3 subjects. Therapy consisted of 35 hemodialyses or peritoneal dialyses. Death was due to circulatory collapse; 9 patients showed circulatory shock lasting from 1-24 hr. at the onset of renal failure due to pancreatitis. The timely and adequate treatment of hypovolemic shock is of primary importance. Because plasma protein loss causes loss of fluid and, consequently, hemoconcentration, the i.v. replacement of H_2O, electrolytes and albumin assures a normal circulatory function. Prognosis may be improved by early peritoneal dialysis.

11702 EXPERIMENTAL TRYPTIC PANCREATITIS THROUGH METABOLIC LESIONS. SEROLOGICAL, HISTOLOGICAL AND ELECTRON MICROSCOPE INVESTIGATIONS.

(Ger.) Kössling, F. K. (Johannes Gutenberg U., Mainz, Germany), M. Nagel and A. Schäfer. Z. Gastroent. 5(3):158-168, 1967.

Pancreatitis was induced in 18 dogs (20 kg wt.) by ligation of the main pancreatic duct, the i.v. inj. of secretin (1 U/kg), and the intra-arterial inj. of 5 ml of Na malonate. Seven dogs developed acute and subacute pancreatitis and died within 60 hr.; 5 developed chronic pancreatitis; 2, subacute and acute. Trasylol treatment was given to 4 chronic dogs. Three other dogs, 1 with ligation of the main pancreatic duct and i.v. inj. of secretin, and 2 with intra-arterial malonate inj. served as controls. Blood tests (as enzyme conc.) were performed on all animals to determine the intensity of the pancreatitis. Tissues were taken for histologic and ultramicroscopic examination. The electron microscope showed a decided pericapillary and interstitial edema in the acute stage. The cisterna of the endoplasmic reticulum were enlarged; ribosomes were markedly thickened; the zymogen granules seemed increased in number; mitochondria, relatively few in number, had increased matrix with fewer cristae, and there were indications of necrobiosis. Dissolution of fine submicroscopic membrane structures followed and endoplasmic reticulum and mitochondria became vacuolated. Conc. of the ground plasma, fat droplets, and lipoprotein structures were observed. All experimental animals presented a severe hemorrhagic pancreatitis. In the control with secretin inj. and duct ligation a mild, chronic, nontryptic pancreatitis ensued. Malonate inhibited the succinic dehydrogenase thus lowering the resistance and leading to autodigestion of the pancreas by pancreatic proteolytic enzymes. It is concluded that the pathogenic effect of bile reflux consists only of ductal high pressure with ensuing edema of the ductal system. Proteolytic enzymes do not require bile for activation.

11703 GALACTOSE-INDUCED PANCREATIC DYSTROPHY OR PANCREATITIS--HISTOLOGIC, HISTOCHEMICAL AND ELECTRON MICROSCOPIC STUDIES.

(Ger.) Putzke, H. P. (U. Rostock, Germany) and A. Bienengräber. Beitr. Path. Anat. 135(3):333-349, 1967.

D-Galactose was fed to 40 rats (150 g wt.) in a diet at a rate of about 5 g day while 30 other rats received D-galactose 1, 1.5 or 2 g/day by i.p. inj. in 50% soln. Galactose admin. was for 5-10 days. Pancreatic tissue was fixed for histochemical tests and ultramicroscopy. The animals fed galactose in the diet were little affected by the sugar; however, those rats which received the sugar i.p. were apathetic and showed loss of wt. About 33% had pale, grayish-yellow pancreati glands; histologically, 66% of the animals had damage to the exocrine tissue of the gland. The acini showed increased secretion granules and tightly-packed acidophil granules in the epithelial cells; the tryptophan reaction was intensified. The ground ergastoplasm seemed to be compressed and the cytoplasmic RNA was reduced. Vacuoles which were present in the basal zone of the cells seemed empty or else they contained eosinophil or strongly-basophilic material. Some nuclei were pyknotic and some acini showed total degeneration. The lumina of intralobular ducts were almost free of secretion. After 10 days of treatment lymphocytic and fibroplastic cells attracted by the inflammation were present in some lobules where the secretory parenchyma had been lost; other undamaged lobules showed acinar epithelium in the stage of completed synthesis or the stable phase. The effect of galactose on the enzyme content was relatively small. The glandular areas with increased secretion granule had greatly enhanced enzyme activity of unspecified esterase and to a somewhat lesser degree of lipase and amylase; alkaline phosphatase, cytochrome oxidase and succinic dehydrogenase were easily activated. In varying degrees these effects were also true for other enzymes. The electron microscope showed degradation of the cytoplasm (with excess secretory granules), fewer mitochondria with increased matrix, and damaged cristae in the degenerating lobules. Membrane structures were abnormal. Infiltration of inflammatory cells indicated pancreatitis.

11704 PERITONEAL DIALYSIS IN PANCREATITIS IN DOGS.

(E.) Cuello, L. (U. Puerto Ric Sch. Med., San Juan), E. Vásquez, R. Rios, V. Gutiérrez and F. L. Raffucci. Bol. Asoc. Med. P. Rico 59(6):237-242, 1967.

Fatal hemorrhagic pancreatitis was produced by autologous bile admin. in dogs, which were then divided into 6 experimental groups. One group constituted untreated controls, while the remaining 5 groups were treated with peritoneal dialysis and normal saline (0.75 ml kg/hr.) and/or antibiotics (chloromycetin, 100 mg; penicilli 400,000 U) and atropine (grains 1/150). Peritoneal dialysis was initiated 1 hr. after release of arterial occlusion and maintained until the dog expired. The lowest degree of hemoconcentration was observed in dogs given dialysis ther Elevated preoperative serum amylase levels were affected by dialysis in any group. Increased survival time, which was statistically significa was noted in treated dogs as compared to control dogs. Blood sugar levels progressively increase in all 6 groups with the highest levels associat with the longest survivors in the last 2 treated groups. At autopsy, dogs treated by dialysis ma fested only a minimal peritoneal reaction. Thes data encourage the use of peritoneal dialysis as

adjunct to antibiotic, anticholinergic and elec-
trolyte soln. therapy in the early phase of
treating severe pancreatitis.

11705 HEPATIC LESIONS IN ACUTE EXPERIMENTAL
PANCREATITIS IN DOGS. (Pol.)
Tyszkiewicz, S. (Inst. Path. Anat., Acad. Med.,
Bialystok, Poland) and E. Bernacki. Acta
Physiol. Pol. 17(3):403-415, 1967.

The effect of acute pancreatitis on the histo-
athologic changes in the liver was studied in
31 dogs of both sexes (av. wt. 15 kg). In each
log, 7 ml of bile, incubated with 20 mg of
crystalline trypsin, was inj. into the main pan-
creatic duct. Thirteen dogs (Group 1) died from
acute hemorrhagic pancreatitis within the first
24 hr. The remaining dogs received parathyroid
ormone (Parathormone; 6 U/kg body wt./day) which
ept them alive. Acute necrotic pancreatitis
as observed in 13 dogs which were sacrificed
fter 4 days (Group 2). The remaining 5 dogs
ere sacrificed between day 14 and 42 (Group 3)
o determine the effect of time on liver changes
uring acute pancreatitis. The extensive patho-
ogic changes in the liver were proportional to
he intensity of the inflammatory process in the
ancreas and were less pronounced in Group 2 than
n Group 1. The changes included parenchymatous
nd vacuolar degeneration and fatty infiltration
f liver cells, diminished glycogen content and
ascular lesions. The epithelial cells of the
ile duct were enlarged, causing occlusion of the
maller ducts and cholestasis. The liver capsule
as stretched, thickened, and infiltrated with
BC and lymphoidal cells. Cytoplasm of the liver
ells contained bile pigment and hemosiderin.
he lumen of the sinusoids was enlarged where
iver cells were small, but narrow and sometimes
ompletely closed where the cells were swollen
nd degenerated. In Group 3 there was an increase
f collagen and argentophilic fibers in the portal
paces, periphery of the lobules and sometimes
ithin the lobules. It is concluded that dogs who
urvive acute pancreatitis show permanent changes
the liver which are characteristic of the
itial phase of liver cirrhosis.

1706 EXPERIMENTALLY INDUCED ACUTE HEMOR-
RHAGIC NECROSIS OF THE PANCREAS FOLLOW-
NG GASTRECTOMY ACCORDING TO BILLROTH II. (Pol.)
owiński, W. (1st Surg. Clin., Warsaw). Pol.
zegl. Chir. 39(6):561-568, 1967.

total of 35 dogs (8-20 kg) were divided into 4
oups. In Group 1 (22 dogs) a closed duodenal
op, 10-15 cm long, containing both openings of
e pancreatic ducts was created. The continuity
the alimentary tract was maintained by con-
cting the stomach to the efferent segment of
e duodenum. In Group 2 (4 dogs) a partial gas-
ectomy according to Billroth II was performed
d an occlusion was created by binding off the
ferent loop with tape. In Group 3 (5 dogs)
ter partial gastrectomy according to Billroth
different degrees of obstruction were obtained
by constriction of the efferent loop (diameter: 10 mm, 8 mm, 6 mm and 4 mm.). Group 4 (4 dogs) having undergone partial gastrectomy only, served as controls. In a few dogs of Groups 1 and 2 a Ba suspension was left in the duodenal loop and later on radiographic examination showed $BaSO_4$ grains in the lumen of the pancreatic ducts and destroyed parenchyma of the pancreas. Diastase examination of the blood, fluid from abdominal cavity, and fluid from the duodenal loop showed an increase of the diastase levels and an increase in the proteolytic activity. All dogs died or were sacrificed within 48 hr. after surgery and histopathologic examinations revealed acute hemorrhagic necrosis of the pancreas in dogs of Group 1 which was probably due to the emptying of duodenal contents into the pancreatic ducts. Dogs of Group 2 had somewhat less severe pathologic changes probably due to a longer duodenal loop. Changes in dogs of Group 3 were more of an inflammatory than a necrotic nature and were more severe with a greater constriction of the lumen. It is suggested that 1 of the causes of acute hemorrhagic necrosis of the pancreas in patients after gastrectomy is the regurgitation of duodenal contents into the pancreatic ducts.

11707 NEW ASPECTS OF TRASYLOL THERAPY. (Ger.) Gross, R. (Ed.) Stuttgart, Schattauer, 1966, 183pp., $5.50.

11708 INFILTRATION OF THE SPLANCHNICS IN THE TREATMENT OF ACUTE PANCREATITIS. (It.) Prior, C. (U. Genoa, Italy), S. Troncone and U. Valente. Minerva Chir. 22(15):856-858, 1967.

11709 SURGERY FOR CHRONIC RELAPSING PANCREATITIS. (E.) Bennett, R. C. (U. Adelaide, Australia), J. D. Harris, R. P. Jepson, K. McKenna, L. J. Opit and W. D. Proudman. Aust. New Zeal. J. Surg. 37(1):31-35, 1967.

11710 SURGERY OF ACUTE NECROHEMORRHAGIC PANCREATITIS. (Sp.) Navarro, R. S. (Sta. Cruz. & Sn. Pablo Hosp., Barcelona, Spain), L. G. Mateos and J. L. Gibert. Rev. Esp. Enferm. Apar. Dig. 26(6):697-711, 1967.

11711 THROMBOELASTOGRAPHIC FINDINGS IN ACUTE PANCREATITIS. (Rus.) Bukin, A. S. (Zaporozhe Inst. Postgrad. Med., USSR) and E. I. Chinchenko. Vrach. Delo (9):125-126, 1967.

11712 PROBLEMS OF ANESTHESIA AND AWAKENING IN SURGERY OF ACUTE PANCREATIC NECROSIS. (Fr.) Zaffiri, O. (Maggiore Hosp., Trieste, Italy) and F. Francescato. Ann. Anesth. Franc. 8(2):527-530, 1967.

11713 CHRONIC PANCREATITIS, CURRENT DIAGNOSIS AND TREATMENT. (Ger.) Ritter, U. (1st Med. Clin., Lubeck, Germany). Deutsch. Med. J. 18(16):481-484, 1967.

11714 DIGESTION AND ABSORPTION OF LIPIDS IN CHRONIC PANCREATITIS. (It.) Barbara, L. (U. Bologna, Italy), G. Fontana, P. Azzaroli, A. Lancellotti and E. Labriola. Riv. Gastroent. 18(6):437-476, 1966.

11715 PRESCRIPTION OF A HIGH PROTEIN DIET IN CHRONIC PANCREATITIS. (Rus.) Tuzhilin, S. A. (Moscow Clin. Hosp.). Vrach. Delo (8):131-133, 1967.

11716 SIGNIFICANCE OF AMYLASE LEVELS IN PANCREATITIS. (E.) Kazmers, N. (Kelsey Mem. Hosp., Lakeview, Mich.). J. Abdom. Surg. 9(9):240-245, 1967.

11717 CHRONIC PANCREATITIS AND ITS EFFECTS ON CARBOHYDRATE AND LIPID METABOLISM. (Ger.) Haenel, U. (City Hosp., Oberkirch/Baden Germany) and R. Heuser. Munchen. Med. Wschr. 109(36):1857-1864, 1967.

11718 MORPHOLOGIC CHANGES IN THE THYROID GLAND ACCOMPANYING ACUTE EXPERIMENTAL PANCREATITIS IN DOGS. (Pol.) Tyszkiewicz, S. (Inst. Path. Anat., Bialystok, Poland) and E. Bernacki. Acta Physiol. Pol. 18(4):659-670, 19

See also abstract nos.: 10935,10983,11009,11010,11013,11014,11015,11052,11065,11108,11315,11330,119

LIVER AND BILIARY TRACT
GENERAL

1719 ACTIVITY OF SERUM AMINOPEPTIDASES IN
DISEASES OF THE LIVER AND BILE DUCTS.
E.) Szczeklik, A. (3rd Dept. Intern. Med.,
roclaw, Poland). Acta Med. Pol. 8(1):1-25,
967.

ne presence in human serum of peptidase activities
oward 2 new synthetic substrates, α-D,L-
spartyl-p-nitroanilide and glycyl-p-nitroanilide,
as established, and the activity of both
ubstrates was compared with serum γ-glutamyl
ranspeptidase and leucine aminopeptidase
ctivities in healthy subjects as well as in
atients with hepatobiliary disorders. Human
erum exhibited enzymatic activites toward
oth of these substrates that differed in some
ochemical and clinical aspects from serum
nzymatic activities toward L-leucyl-β-naphthyl-
nide and γ-L-glutamyl-p-nitroanilide. An
ncrease of activity toward all 4 substrates was
ound in a high percentage of cases with
epatobiliary diseases, thus making the determina-
on of these activities useful in clinical
agnosis. Changes in γ-glutamyl transpeptidase
ctivity and in glycyl-p-nitroanilide splitting
ctivity appeared to be more sensitive liver
unction tests than the estimation of serum
ctivity toward L-leucyl-β-naphthylamide and
D,L-aspartyl-p-nitroanilide. Obstructive
undice, cancer of the liver and biliary
rrhosis were accompanied by higher elevation
peptidase activities toward all 4 studied
bstrates than viral hepatitis, portal cirrhosis
d cholecystitis without jaundice. Normal
D,L-aspartyl-p-nitroanilide-splitting activity
serum, in the presence of a marked elevation
the other peptidase activities, is suggestive
liver cancer. Leucyl, aspartyl and glycyl
inopeptidase activities exhibited a decline
hepatic coma several days before death.

1720 pH AND CONCENTRATION OF PANCREATIC
ENZYMES IN ASPIRATES FROM THE HUMAN
ODENUM DURING DIGESTION OF A STANDARD MEAL
PATIENTS WITH BILIARY OR HEPATIC DISORDERS.
.) Worning, H. (Blegdams Hosp., Copenhagen),
Müllertz, E. H. Thaysen and H. O. Bang.
and. J. Gastroent. 2(2):150-156, 1967.

a series of patients comprised of 34 (5 men,
women) with anicteric biliary diseases
hose with gallstones and patients subjected
cholecystectomy), 20 (6 men, 14 women) with
structive jaundice (these had common bile
ct stones) 8 (4 men, 4 women) with hepatic
rrhosis (portal or biliary cirrhosis) and 3
men, 1 woman) with hemochromatosis, the
testinal contents were aspirated in 4
bsequent periods of 20 min. each after ingestion
a standard meal. The vol., pH and conc.
α-amylase, trypsin, chymotrypsin and lipase
re determined in the collections. The conc.
the different enzymes remained unchanged
roughout the period of aspiration in the groups of patients studied; the conc. in female and male patients were identical in all groups of patients. The conc. of lipase was more markedly reduced than the conc. of amylase and of trypsin in patients with anicteric biliary diseases and in patients with hepatic cirrhosis. Conc. of enzymes below the lowest normal value throughout the period of digestion represented an uncommon finding. Low conc. of amylase were noted in the 3 patients with hemochromatosis. The exocrine pancreatic function, it is concluded, is rarely found to be reduced in patients with biliary or with hepatic disorders.

11721 HEPATIC-ARTERY LIGATION FOR HEPATIC HEMANGIOMATOSIS. (E.) DeLorimier, A. A. (U. California Sch. Med., San Francisco), E. B. Simpson, R. S. Baum and E. Carlsson. New Eng. J. Med. 277(7):333-337, 1967.

Hepatic capillary hemangioma, like cutaneous hemangioma, is characterized by rapid progression in early infancy, followed by involution. When involuting hepatic hemangiomas are symptomatic, they diffusely involve the liver and produce arteriovenous shunts and high-output heart failure; the triad of multiple enlarging cutaneous hemangiomas, hepatomegaly and congestive heart failure follows. In all but 2 of the 25 cases reported since 1932, high-output congestive heart failure developed due to a large hepatic arteriovenous shunt through the tumor in the liver; 22 of the 25 patients with high-output heart failure died. In the present case, a baby girl with conventional hepatic hemangioma pathology, the hepatic artery was ligated at its origin from the celiac artery, proximal to the right gastric and gastroduodenal branches, in order to diminish the large hepatic arteriovenous shunt; this relieved the high-output heart failure and the patient recovered. This is the first reported case in which this technic was used for treatment of hepatic hemangiomatosis.

11722 DETERMINATION OF FATTY ACID AND TRIGLYCERIDE TURNOVER IN THE PLASMA OF MAN UNDER NORMAL AND PATHOLOGIC PHYSIOLOGICAL CONDITIONS. (Ger.) Sandhofer, F. (U. Clin. Innsbruck, Austria). Wien. Z. Inn. Med. 48(5)(Suppl.):1-32, 1967.

Both the single inj. and the infusion methods of admin. of tritiated palmitic acid were used to study the quantitative turnover rate of free fatty acids and triglycerides in the plasma; both methods gave comparable results. Measurements of radioactivity were made in a liquid scintillation counter after peparation of the fatty acids, triglycerides and other lipid fractions by thin-layer chromatography. The conc. of fatty acids, triglycerides, rate of incorporation of radioactive fatty acid into triglycerides, the blood sugar level, and the blood cholesterol conc. were all determined. These tests were conducted on 11 normal subjects, on 6 with essential hyperlipemia, 5 with symptomatic hyperlipemia, 7 with liver cirrhosis, 5 with hyperthyroidism, and 11 with diabetes mellitus. In essential hyperlipemia the formation of plasma triglycerides was moderately increased but the chief cause for the excessive accummulation of plasma triglycerides was the diminished removal of triglycerides from the blood. In liver cirrhosis, especially decompensated cirrhosis, only a small amount of fatty acids were incorporated into plasma triglycerides despite high conc. of free fatty acid in the arterial blood; this could have been due to a defect of liver cell function and/or disturbed hepatic circulation. Among patients with hyperthyroidism, the turnover of free fatty acids in the plasma was increased; the free fatty acids were rapidly oxidized and were esterified to triglycerides only in small quantities. In diabetic decompensation as well as in cases of low blood sugar values, free fatty acids were utilized for energy and the synthesis of triglycerides was diminished. With a blood sugar level of about 200 mg% in spite of low fatty acid turnover, the greatest rate of triglyceride synthesis was observed.

11723 LIPOPROTEIN LIPASE ACTIVITY, SERUM LIPIDS, AND THE HEPARIN EFFECT UPON BLOOD SUGAR LEVEL IN ATROPHIC LIVER CIRRHOSIS AND CHRONIC HEPATITIS.

(Ger.) Bosadjiewa, E. (Med. Inst., Varna, Bulgaria), G. Warbanow, S. Markowski, L. Beltschew and E. Russinow. Z. Ges. Inn. Med. 22(13):393-396, 1967.

Twelve patients with atrophic liver cirrhosis, 8 with chronic hepatitis, and 17 healthy persons each received a morning, fasting, i.v. drop infusion of 500 ml saline soln. containing 150 mg heparin in 4 hr. Before and after the infusion, blood sugar levels, free serum heparin, and serum lipids were determined; in the lipid fraction cholesterol, phospholipids, β-lipoproteins, unesterified fatty acids and triglycerides were measured as well as serum lipoprotein lipase activity. The total lipids and the β-lipoproteins were lower in cirrhotics than in normal subjects and the lipoprotein lipase and free heparin were higher. Among those with chronic hepatitis only free serum heparin was elevated while all other factors were normal. The differences between the cirrhotics and the patients with chronic hepatitis were statistically significant, even the serum heparin conc. which was greater in cases of hepatitis than cirrhosis. The infusion of 150 mg heparin in normal subjects caused a statistically significant increase of unesterified free fatty acids, free heparin, and recalcification time. In cases of hepatitis, a statistically significant decrease of cholesterol, total lipids, triglycerides and β-lipoproteins occurred and a significant elevation of unesterified fatty acids, free heparin and recalcification time also took place. The correlation between the elevation of blood sugar produced by heparin and the decrease of β-lipoprotein in the cirrhotics and the diminished cholesterol and β-lipoprotein in chronic cases of hepatitis was significant. No such correlation between the normal and cases of chronic hepatitis was found. A significant correlation among increased sugar levels due to heparin and the elevation of free fatty acids and serum heparin within the group of cirrhotics was observed.

11724 THE PRESSURE-VOLUME DIAGRAM AND ELASTICITY OF THE TOTAL LIVER VASCULAR SYSTEM OF THE CAT IN SITU.

(Ger.) Lutz, J. (U. Wurzburg, Germany), U. Peiper, J. Segarra-Domenech and E. Bauereisen. Pflueger Arch. Ges. Physiol. 295(4):315-327, 1967.

Anesthetized cats (14) were studied during elevation of hepatic venous blood pressure by perfusion at a constant rate of flow by the hepatic artery and/or the portal vein. The animals were heparinized and blood from the aorta was passed through a regulating pump into the cannulated hepatic vessel, or the vessel was perfused from an oxygenated reservoir of diluted beef blood warmed to 38°C. The measurements made were the venous pressure in cm H_2O (the variable factor which could be altered by changing the hydrostatic pressure of the perfusion fluid) and the vol. outflow from the system was recorded by an electric-drop counter. A number of other factors were considered; the effect of the rate of flow upon the size of the drops, and the action of increased venous pressure (e.g., from 3-6 cm H2O) in causing a period of variable drop rate prior to a steady state. Pressure-vol. curves in most cases showed a convexity toward the vol. axis, but in some there was a sigmoid shape. From these data are derived: storage vol. (3.78 ml/kg); vol. elasticity $E'=\frac{\Delta p}{\Delta V}$ (slope) = (2450 dynes cm^{-5}/kg); and compliance (2.42 ml/mmHg x 100g of tissue). The liver represents 12.5% of the estimated distensibility of the entire blood-vascular system. These factors are based on a venous pressure range of 0-9 cm H_2O.

11725 MEASUREMENT OF THE SIZE OF THE LIVER IN THE NEWBORN: A RADIOGRAPHIC ESTIMATE.

(E.) Howie, R. N. (U. Auckland, New Zealand). Aust. Paediat. J. 3(2):113-118, 1967.

Over a 12-mo. period, 492 chest radiographs were taken of 205 newborn babies, premature and fullterm; these included 178 babies with variety of respiratory disorders, 12 normal abies and 15 with symptoms of asphyxia at birth it who subsequently had no respiratory fficulties. Forty % of the films were taken the first day of life, and the remainder to the age of 2 mo. Measurements of its ickness were made in films which included e liver area and in which an apparent outline the liver could be seen; an oblique line was awn along the presumed liver edge and a rallel line drawn at a tangent to the right aphragm. The distance (m) at right angles etween these lines was measured in cm. Measure- nts on the radiographs were related to the . of the liver recorded at necropsy in 22 bies who died within 24 hr., and in a further who died within the following 12 mo. The tline of the liver was not included in 51 of e 492 radiographs; in the other 441 films, gas the intestine and air in the lungs outlined e liver shadow in 307 (69.6%). There was a asonably close correlation between the wt. the liver in g and the cube of the thickness the liver in cm (m^3) to the extent that the . could be predicted from the formula: ver wt. (g)=0.85 m^3 + 19.2. In some babies, duly small or large amounts of intestinal s influenced the apparent size of the liver d therefore the estimation of its wt.; when cessive amounts of gas were present, the liver peared deceptively small. In 25 babies, 3 more radiographs of the chest were taken ring the first 2 wk. of life; there was no ange in liver size in 17 babies, including with the idiopathic respiratory distress ndrome; in 1 there appeared to be a consistent crease in size, in 4 a consistent diminution d in 3 cases an apparently random variation, obably due to variations in the amount of imentary gas. This method appears to be eful, within limits, in estimating the size the liver in the living infant. The amount intestinal gas present, if excessively unduly small, influences the estimation liver size.

1726 SERUM MUCOPROTEIN LEVELS IN AMOEBIC LIVER ABSCESS. (E.) Ruas, A. Inst. Med. Res., Lourenco Marques, Mozambique) d R. Nunes De Almeida. Ann. Trop. Med. rasit. 61(1):21-25, 1967.

e correlation between serum mucoprotein values d certain pathological conditions would pear to offer a potential method for the iagnosis of these conditions. Nothing in the iterature has been found that would relate rum mucoprotein content and amoebic liver scess. In this study the serum mucoprotein vel of 61 adult male patients with a confirmed iagnosis of this condition was found to be ignificantly elevated. The fact, however, at an elevated serum mucoprotein level is countered in a variety of diseases does not ke this determination especially useful in the agnosis of amoebic liver abscess. It has oved helpful in the differentiation of amoebic liver abscess and primary carcinoma of the liver, in which the serum mucoprotein level is not elevated in all instances. In those cases in which the level was elevated the rise was moderate whereas in amoebic liver abscess the elevation is characteristically high. The addition of the serum mucoprotein level determination to the usual indices of diagnosis of amoebic liver abscess (symptomatology, radiology and liver puncture) should be useful in future diagnostic procedures.

11727 AN ELECTRON MICROSCOPIC STUDY OF THE LIVER PARENCHYMA AND SCHISTOSOME PIGMENT IN MURINE HEPATOSPLENIC SCHISTOSOMIASIS MANSONI. (E.) Stenger, R. J. (Western Res. U. Sch. Med., Cleveland, Ohio), K. S. Warren and E. A. Johnson. Amer. J. Trop. Med. 16(4):473-482, 1967.

Overt hepatosplenic schistosomiasis developed in mice after their exposure to cercariae of a Puerto Rican strain of Schistosoma mansoni. After 8, 11, 33 and 52 wk. of infection, livers of the mice were prepared for light and electron micrscopic study. During all intervals, randomly-observed and periportal parenchymal cells exhibited ultrastructural integrity. In the early stage of the disease, paragranuloma hepatocytes displayed subcellular alterations indicative of hepatocellular injury, but at late intervals, paragranuloma hepatocytes revealed no major ultrastructural abnormality. These observations provided further evidence that toxic factors from adult schistosome worms do not adversely affect the hepatic parenchyma. The ultrastructural data corroborated previous evidence indicating that the schistosome ovum is the primary factor in the pathogenesis of overt hepatosplenic Schistosomiasis mansoni. The electron-microscopic study revealed the schistosome pigment as comprised of intensely osmiophilic, very dense, ovoid and doughnut-shaped structures. In this form, the pigment was observed in Kupffer's cells along the hepatic sinusoids and in the phagocytic cells of the hepatic granulomata.

11728 EFFECTS OF A TREATMENT WITH COENZYME A, α-LIPOIC ACID, DIPHOSPHOPYRIDINE NUCLEOTIDE AND COCARBOXYLASE ON ENDOGENOUS HEPATIC COMA. (E.) Thölen, H. (Med. U. Clin., Basel, Switzerland), A. Colombi, F. Duckert, F. Huber, H. R. Müller and F. Bigler. Helv. Med. Acta 33(6):492-504, 1967.

A total of 20 patients with disturbances of consciousness due to the following diagnosis were treated: hepatitis, 15 (acute necrosis of the liver in 6), purulent cholangiohepatitis, 1 and intoxication with Amanita phalloides, 1. The patients were treated with i.v. infusions of coenzyme A, α-lipoic acid and diphosphopyridine nucleotide; supplements of cocarboxylase were given in 16 cases. Usually 240 mg coenzyme A (75-80%) and equimolar quantities of α-lipoic acid, diphosphopyridine nucleotide and cocarboxylase, dissolved in isotonic glucose or saline (240 ml), were admin. (1 ml/min.) daily. The treatment was successful in 15 of 20 cases; 7 of the 15 successfully-treated patients demonstrated severe disturbances of consciousness. In most cases, mental improvement occurred between the second and fourth day of treatment. Three of 5 unsuccessfully-treated patients were admitted to the hospital in a terminal stage, had total necrosis of the liver and died during or immediately after the first infusion. After treatment pyruvic acid, acetoin, 2,3-butylene glycol or acetoin-2,3-butylene glycol conc. in blood showed a diminution in 66% of all cases. In most cases Quick values and coagulation factors rose during treatment. Hypalbuminemia was corrected in 4 of 6 patients; of 8 patients with hyper-γ-globulinemia, 5 had normal and 3 nearly normal γ-globulin values after treatment. During treatment blood ammonia levels were measured in 14 patients, with a decrease in 11 and an increase in 2. Immediately after treatment, a decrease of serum bilirubin (15 of 17), SGOT (13 of 14), SGPT (17 of 17) and serum Fe (6 of 7) was observed. Of the 15 patients with decreased serum bilirubin, 11 had an increase of short duration initially during treatment. Patients in whom disturbances of consciousness had disappeared before liver biopsy, still showed remarkable pathologic changes of the liver. In 10 patients with repeated liver biopsies, the final biopsy was nearly normal.

11729 IMMUNOLOGY IN CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Ger.) Kinda, K. (Petrosu Hosp., Moinesti, Rumania). Z. Ges. Inn. Med. 22(14):430-432, 1967.

The following tests were carried out in 25 patients with chronic hepatitis: (1) Thymol, (2) Kunkel's, (3) Huerga-Popper's, and (4) Huerga-Popper's with the following modifications: inactivation of C'_1 and C'_2 fractions of the complements by heating to 56°C for 1 hr.; inactivation of C'_2 fraction by heating to 50°C for 0.5 hr.; inactivation of the C'_3 fraction by zymosan; and inactivation of the C'_4 fraction by NH_3. Inactivation at 56°C for 1 hr. or at 50°C for 0.5 hr. yielded exactly the same numerical values in the Huerga-Popper test as in Kunkel's. The $SH_2 \rightleftarrows S{=}S$ reaction becomes irreversible with heat, S=S being the stable configuration. This was investigated further in 9 cases of compensated and decompensated liver cirrhosis; when decompensation was extreme the values of the Huerga-Popper reaction reached the values of the Kunkel test. The titer of C_2 (the main fraction of the complement) was studied by means of hemolytic reactions in the group of patients with compensated and varying degrees of decompensated liver cirrhosis and in 9 healthy controls. The cirrhotics had much weaker titers of C_2 than the normal; 1 of the completely decompensated ones showed no titer and the other showed the weakest perceptible titer. It is suggested that this technic might be a measure of functional damage in the liver.

11730 BROAD-BAND HYPERGAMMAGLOBULINEMIA AND CHRONIC LIVER DISEASE. I. DIAGNOSTIC AND PROGNOSTIC MEANING OF THE ELECTROPHORETIC PATTERNS. (E.) Bonomo, L. (U. Bari, Italy) and U. Gillardi. Acta Hepatosplen. (Stuttgart) 14(3):142-151, 1967.

A total of 286 electrophoretic patterns with broad-band mountain-like hypergammaglobulinemia were studied; these were obtained from 162 patients with various liver disease states (liver cirrhosis, 86; progressive chronic hepatitis, 34; infectious hepatitis, 4; cardiac cirrhosis, 15, and other chronic liver diseases such as alcoholism, 23) and 124 with nonliver disease states (chronic bronchitis, 33; connecti tissue disease, 24; chronic brucellosis, 6; chronic kidney disease, 10; lymphomatous and blood diseases, 14; and miscellaneous, 37). Such hypergammaglobulinemia patterns were divide into 3 types according to the degree of hypergammaglobulinemia and its extension into the β- and α-region with bridging, e.g., loss of demarcation between the β- and γ-globulins. The A pattern was characterized by the evident increase of the γ-globulin fraction which showed a mountain-like peak; it was usually much broade than steep and distinctly separated from the β-globulin peak. The B-pattern was characterize by the occurrence of β- γ-bridging; the shape of the γ-globulin peak was broader and in some cases steeper than the A type. The C pattern more evidently showed the β- γ-bridging; there was a huge γ-globulin peak which extended into the β-globulin area; its ascending branch did not show a clearcut origin but actually began in the β and often the α_2-globulin area; the albumin level was at the lower limits of normal. The A pattern, which showed the less-marked alterations, was mostly found in cases with various non-liver diseases (which accounted for 72% of such patterns). Of the B patterns, which showed more marked alterations, 60% occurred in liver disease states; however, other disease conditions were frequently associated with this type of pattern (connective tissue diseases, chronic bronchopulmonary disease, and others). The C pattern, which had the most severe alterations, occurred predominantly (in 81.9% of the cases) in liver cirrhosis, mostly in the post hepatic type of liver damage; 6.5% of such patterns belonged to patients with connective tissue diseases. Some relationship appeared to exist between the etiopathogenesis (alcoholic or post hepatic) of liver disease states as estimated by the history as well as by histopathological data, and the 2 most severe types (B and C) of mountain-like hypergammaglobulinemic patterns. Therefore these features of hypergammaglobulinemia appear to bear diagnostic and prognostic implications.

731 BROAD-BAND HYPERGAMMAGLOBULINEMIA
AND CHRONIC LIVER DISEASE. II.
MUNOGLOBULIN LEVELS IN LIVER CIRRHOSIS. (E.)
nomo, L. (U. Bari, Italy) and U. Gillardi.
ta Hepatosplen. (Stuttgart) 14(3):152-156,
67.

e levels of the 3 classes of immunoglobulins,
A, and M, were determined in 51 sera from
tients with broad-band hypergammaglobulinemia,
d the possible relationships between the
munoglobulin levels and the clinical diagnosis
d stage of the liver disease were studied.
addition, serum levels of the 3 immunoglobulins
re estimated in patients with post-hepatic or
e alcoholic type of liver cirrhosis. Of
e sera studied, 10 (4 from patients with
ronic bronchitis; 6 from chronic hepatitis
tients) showed an A-pattern, 10 a B-pattern
d 31 a C-pattern (the last shows the most
vere degree of hypergammaglobulinemia and
γ-bridging). All 41 exhibiting the B and
patterns belonged to patients with liver
rhosis. A post necrotic pattern prevailed
on biopsy study in all 16 cases of post hepatic
rrhosis so-studied, whereas a portal pattern
s observed in all 5 cases of clinically-diag-
sed alcoholic cirrhosis who were studied by
opsy. The quantitative evaluation of the
mmunoglobulins was carried out by means of
gel diffusion technic incorporating the
ecific antisera into the agar. A progressive
crease of the immunoglobulin A fraction was
und in parallel with the increase of the β-
ridging phenomenon in the electrophoretic
ttern. In parallel with the increase of the
munoglobulin A fraction, there was also a
ogressive increment in the immunoglobulin M
ction, particularly in patterns of the C
pe. The most marked increments of the
munoglobulins A and M fractions were found
the post hepatic type of liver cirrhosis, in
reement with the predominant incidence of the
pattern in this type of cirrhosis. The
umin fraction was also significantly lowered
this type of cirrhosis.

32 OBSTETRIC CHOLESTASIS AND PRURITUS
OF PREGNANCY. (E.) Kater, R. M. H.
y. Prince Alfred Hosp., Sydney, Australia)
S. P. Mistilis. Med. J. Aust. 1(13):638-640,
7.

tudy of liver disease in pregnancy and
ritus of pregnancy was initiated to determine
incidence of obstetric cholestasis and
relationship of this entity to pruritus
pregnancy. A total of 42 women were found
have liver disease out of 8810 confinements
r a 2-yr. period. Obstetric cholestasis
ich was not previously reported in Australia)
the most common liver disorder, being
sent in 12 of the 42 cases, and also the
t common cause of jaundice during pregnancy.
tetrical cholestasis was characterized by a
d degree of jaundice and severe pruritus in
the third trimester with rapid spontaneous resolution after delivery, marked elevation of the serum alkaline phosphatase and specific liver phosphatase levels, and canalicular cholestases out of proportion to the degree of hyperbilirubinemia on light microscopy. Pruritus of pregnancy was also common. The identical episodes of pruritus, which ofter recurred in subsequent pregnancies, the comparable elevation of the serum alkaline phosphatase and specific liver phosphatase levels, and the similar changes on light microscopy from aspiration liver biopsy sections, suggested that pruritus of pregnancy and obstetrical cholestasis are merely clinical variants of an identical liver disorder. The dilatation of the bile canaliculi, and the swelling and distortion of the microvilli on electron microscopy in a case reported in this series, appear to point to an excretory defect at this level in the parenchymal cell. The rapid relief of cutaneous itching in 4 patients given cholestyramine p.o. suggested that the pruritus of these 2 disorders was due to reduced liver excretion of bile salts.

11733 HYPERBILIRUBINEMIA: SIGNIFICANCE OF
THE RATIO BETWEEN DIRECT-REACTING
AND TOTAL BILIRUBIN. (E.) Fevery, J. (St.
Raphael Acad. Hosp., Louvain, Belgium),
J. Claes, K. Heirwegh and J. De Groote.
Clin. Chim. Acta 17(1):73-79, 1967.

Direct-reacting and total bilirubin were determined in sera from patients with obstructive jaundice, hepatitis and cirrhosis by 3 different methods. Basically the same results were obtained using the method of Jendrassik and Cleghorn (modified) and the method of Weber and Schalm; the former had the advantage of greater simplicity. Results obtained with the method of Ducci and Watson showed somewhat greater scattering. With these 3 methods, a linear relationship was found between direct-reacting and total bilirubin in cirrhosis, hepatitis and obstructive jaundice (intra- and extrahepatic). Using the methods of Jendrassik and Cleghorn, and of Weber and Schalm, an identical regression coefficient was observed for the different groups examined. This relationship was characteristic for so-called postmicrosomal icterus. In contrast, the premicrosomal and microsomal jaundice (increased production, reduced hepatic uptake or conjugation) had a much lower proportion of direct-reacting pigment. The homogeneity of the postmicrosomal jaundice group with regard to bilirubinemia was not explainable, but it is clinically useful for the diagnosis of cases with mixed jaundice pathology.

11734 DIRECT SERUM BILIRUBIN AND THE
SULFOBROMOPHTHALEIN TEST IN OCCULT

LIVER DISEASE. (E.) Gambino, S. R. (Englewood Hosp., N. J.), A. Other and W. Burns. J.A.M.A. 201(13):1047-1049, 1967.

Direct serum bilirubin and BSP retention were studied in various patients with liver disease to determine if there is a correlation between them, since bilirubin and BSP are cleared through the same hepatic pathway. Direct bilirubin levels and BSP retention were simultaneously measured in 52 patients with normal total bilirubin levels (less than 1.0 mg/100 ml); when direct bilirubin exceeded 0.20 mg/100 ml (21 patients), BSP retention was always abnormal; however, in 13 patients BSP was greater than 5% even though direct bilirubin was less than 0.20 mg/100 ml. Direct serum bilirubin was measured just before, and 45 min. after, BSP inj. in 22 patients with normal total bilirubin levels; in every case but 1, direct bilirubin increased after BSP inj. if BSP retention was greater than 4.5%. Serial measurements of direct bilirubin and total bilirubin were made in 13 patients recovering from known liver or biliary tract disease; in each case total bilirubin levels returned to normal before direct bilirubin levels. The authors failed to find any normal subject with a direct bilirubin level greater than 0.20 mg/100 ml. A positive correlation was found between BSP retention and increase in direct bilirubin levels that followed BSP inj., and these results support the clinical and chemical validity of direct bilirubin measurements as an index of occult liver disease.

11735 RENAL BILIRUBIN CLEARANCE IN LIVER PATIENTS. (E.) Fevery, J. (St. Rafael Acad. Hosp., Louvain, Belgium), K. Heirwegh and J. De Groote. Clin. Chim. Acta 17(1):63-71, 1967.

In human subjects, usefulness of renal clearance studies of bilirubin is limited by the chemical instability of this material and by important errors affecting short-time collections. In 0.25 mM disodium ethylenediaminetetraacetic acid at 4° in the dark, urinary bilirubin pigments are stable for 4 hr.; by calculating the clearance, using data obtained from successive short-time collections (chemical stability), these errors can be largely eliminated. Employing these principles, renal bilirubin clearances (35) were determined in 27 patients with various liver diseases: parenchymatous jaundice--viral hepatitis, 5; and cirrhosis, 5; obstructive jaundice--extrahepatic, 7 (nonmalignant in 4, and malignant in 3); intrahepatic, 4; cirrhosis with obstructive jaundice, 5; and unexplained cholestasis, 1. The effect of dehydrocholic acid was determined in 2 cirrhotic patients. Mean values of the 8-hr. clearances obtained by this method differed significantly in hepatitis, cirrhosis and obstructive jaundice. The 8-hr. clearances for those with hepatitis or cirrhosis were independent of the rate of urine output and of the serum bilirubin conc.; the difference between the mean of total bilirubi clearance found for both groups was highly significant (0.086 ± 0.020 for hepatitis, and 0.138 ± 0.014 for cirrhosis), and could have some diagnostic value in the differentiation of the 2 types of disease. The difference was even more striking between parenchymatous and cholestatic hepatitis. The mean value of the 8-hr. clearance of total bilirubin found in obstructive jaundice group (intra- and extrahepatic) differed significantly from the results obtained for patients with hepatitis or cirrhosis (0.334 ± 0.106 against 0.110 ± 0.033). Clearance values increased upon i.v. inj. of 2 g dehydrocholic acid. Values of renal clearance in obstructive jaundice correlated positively with serum bilirubin values, and evidence is presented to relate this effect to increased bile salt conc. in the blood of patients with obstructive jaundice. These observations are compatible with glomerular filtration as the main mechanism of renal elimination of bilirubin in man.

11736 LAPAROTOMY FOR JAUNDICE. (E.) Bourke J. B. (London Hosp., England), P. Cannon and H. D. Ritchie. Lancet 2 (7515):521-523, 1967.

Over a 4-yr. period, 152 patients underwent laparotomy due to jaundice; the actual diagnosis in these patients was carcinoma causing obstructive jaundice in 76, choledocholithiasis causing obstructive jaundice in 61, chronic pancreatitis and mass in head of pancreas in 3 each, sclerosing cholangitis, hydatid disease of the liver and hepatitis in 2 each, and pancreatic cyst, primary biliary cirrhosis, and drug jaundice (chlorpromazine) in 1 each. The jaundice was medical in 3 cases (2 with hepatitis, 1.3% of the cases; and 1 (0.7%) with drug jaundice). There was no mortality. The steroid diagnostic test, percutaneous liver biopsy and percutaneous transhepatic cholangiography produced misleadin or unhelpful results in some cases, and serious complications in others. Preoperative liver biopsies done on 13 occasions gave no help in establishing the diagnosis in 6, disclosed the features of extrahepatic obstructive jaundi in 4, of secondary carcinoma in 2 and the resul was misleading in 1 patient. Severe complicati from this procedure occurred in 2 patients: 1 required laparotomy due to biliary peritonitis and the other had to have blood-transfusion for i.p. hemorrhage. Percutaneous transhepatic cholangiography was done on only 3 individuals; in 2 it was unsuccessful because the bile ducts were not entered, and the third patient was successfully shown to have an obstruction in the choledochus, but still required surgery. It is suggested that if the cause of jaundice is in doubt, observation of the patient should continue for not less than 3 wk., by which time the diagnosis will often have become apparent. If a diagnosis has not been made after 6 wk. of jaundice, laparotomy should then be carried out

1737 A SYSTEM OF LABORATORY TESTS FOR THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE. Pol.), Gorzkowski, E. (2nd Clin. Intern. Dis., zczecin, Poland), H. Szymańska, A. Nieczajew nd H. Myśliwicz-Rychlik. Pol. Arch. Med. Wewnet. 3(1):25-32, 1967.

ne results of the following laboratory determin- tions from 75 patients with viral hepatitis, 5 with cholelithiasis and 34 with jaundice f neoplastic origin were compared and analyzed or their diagnostic value: SGPT, SGOT, ldolase, phosphohexoisomerase, alkaline phos- hatase, Fe: Cu ratio, free and esterified holesterol, seromucoid and Jirgl's test. The xtreme values obtained in weekly intervals for iral hepatitis and mechanically-caused jaundice ere presented and the percentage of character- stic results determined. The arithmetic eans of the test values for the entire duration f jaundice were graphically compared. A test ystem is suggested which would facilitate the agnosis in the early as well as late phase of aundice and make it possible to follow the ynamics of the inflammatory process, functional ondition of the liver and patency of the liary tract. The tests recommended in the arly stage (7-10 days) of jaundice are: primary SGPT, esterified cholesterol/free cholesterol kaline phosphatase, Jirgl's test; secondary seromucoid, Fe/Cu. In the late stage of aundice (10 days or longer) the recommended ests were: primary - Fe/Cu, esterified choles- erol/free cholesterol, alkaline phosphatase, rgl's test; secondary - SGPT, seromucoid. aundice with significantly increased phospho- exoisomerase and alkaline phosphatase activity, high level of seromucoid, a strongly positive rgl test (+++) but with normal or only very ightly elevated transaminase activity and ecreased Fe level suggest a neoplastic origin this disease.

1738 PLASMA LIPIDS IN RECURRENT JAUNDICE OF PREGNANCY. (E.) Svanborg, (U. Goteborg, Sweden) and O. Vikrot. cta Med. Scand. 181(1):83-87, 1967.

ne levels of various plasma lipids were analyzed 8 patients (23-30 yr. old) with recurrent aundice of pregnancy during and after the aundice phase, and the data was compared with at from a previous study on 23 normal pregnant emales. Lysolecithin was slightly lower and riglycerides were slightly higher than in ormal pregnants. Free fatty acids were very nevenly distributed and showed no tendency oward either low or high values. Analysis blood samples 4 or more wk. after delivery owed levels which were essentially in agreement th those of healthy young nonpregnant females. is study showed that there was no difference plasma lipids between women with recurrent aundice of pregnancy and normal pregnants. ne results do not support the hypothesis that ne metabolic disturbances in this disease rovoke alterations in the plasma lipid level.

11739 THE SERUM FLOCCULATION TEST FOR THE DIFFERENTIAL DIAGNOSIS OF OBSTRUCTIVE JAUNDICE. SUMMING UP OF RESULTS AND EXPERIENCE. (E.) Jirgl, V. (Inst. Hemat. & Blood Trans., Prague). T. Gastroent. 10(2): 160-174, 1967.

In the serum flocculation test, 1.6 ml of blood serum and 4 ml of 0.1 N KOH are mixed, and 45 min. later 4 ml of 20% sulfosalicylic acid is added; 10 min. after mixing, the content is filtered; 5 ml of filtrate and 1 ml of 5% tungsten phosphoric acid in 2 N NaOH are mixed for 10 min. and then centrifuged for 15 min. at 1500 rpm. The supernatant is discarded and the residual precipitate dissolved in 6.5 ml of 10% Na_2CO_3 and 0.5 ml Folin-Ciocalteau phenol reagent, diluted in the ratio of 1:3 with water. After strong mixture by shaking, the result is determined against a dark background using strong incident light; results are characterized as 1) negative (tube contents remain clear or slightly bluish in color; 2) positive (+), opalescence; 3) positive (++), turbidity; and 4) positive (+++), precipitate. Results of a survey of the world-wide use of this test, based on more than 80 papers published on its use, showed that the av. values of correct results of the test were 91.15% and 89.55% for obstructive and hepatocellular jaundice, resp. The component which renders this test positive was found to have some properties in common with β-lipoprotein.

11740 THE SYNTHESIS OF TAUROCHOLIC AND GLYCOCHOLIC ACIDS IN HUMAN LIVER HOMOGENATES AND SUBCELLULAR FRACTIONS IN OBSTRUCTIVE JAUNDICE. (E.) Scherstén, T. (Sahlgrenska Hosp., Goteborg, Sweden). Scand. J. Gastroent. 2(1):49-58, 1967.

The synthesis of taurocholic and glycocholic acids was studied in the whole homogenate and in subcellular fractions of livers from 18 patients (10 men, 8 women; 26-86 yr. old; 4 with carcinoma of the pancreas and 14 with choledocholithiasis) operated on for cholestasis and compared with a control material (taken from 38 patients operated on for uncomplicated gastric or duodenal ulcer or nonobstructive gallbladder disease; this included 12 men and 26 women; 24-70 yr. old), with clinically normal liver function. A considerable decrease of synthesis of cholic acid conjugates was found in icteric homogenates, while no significant alteration of the synthesis was found in subcellular fractions containing the bile acid activating and transferring enzyme. The synthesis of cholic acid conjugates in icteric homogenates showed an inverse significant correlation to serum bilirubin values. Cholic acid conjugates added *in vitro* inhibited synthesis of conjugates in homogenates in homogenates and subcellular fractions. Bilirubin, added *in vitro*, brought about a significant decrease in synthesis of conjugates in homogenates but no changes of synthesis in the subcellular fractions mentioned. Soluble fraction as well as isolated mitochondria obtained from icteric human liver inhibited synthesis of conjugates in the microsome fraction and in the combined microsome fraction and L-fraction. Oligomycin significantly increased the synthesis of conjugates in icteric homogenates; it did not influence synthesis in the mentioned subcellular fractions from icteric levers or in homogenates from livers with clinically normal function. However, in no case did moligomycin raise the synthesis of bile acid conjugates in icteric homogenate to that of controls. It is suggested that the bile acid conjugating enzyme system is intact in cases of cholestasis of short duration (less than 14 days) and that the decreased synthesis of conjugates in icteric homogenates might be the result of a product inhibition of the conjugation reaction by retained bile acid conjugates and of stimulated mitochondrial ATPase activity caused by retention of bile components.

11741 CARDIAC OUTPUT AFTER PORTACAVAL SHUNT.

(E.) Johnson, G., Jr. (U. North Carolina Sch. Med., Chapel Hill) and J. Lambert. Ann. Surg. 166(2):207-212, 1967.

The following change in cardiac output was seen in 6 dogs after portacaval shunt: an elevation in the cardiac output in each dog with a mean increase for the series of 53 ml/kg/min. and cardiac output (unrelated to the wt. of the animal) increased by a mean of 645 ml/min. compared to 108 ml/min. (the mean cardiac output increase in 6 dogs who underwent sham operation). The mean difference for the series before and after sham operation was 1 ml/kg/min. Mean arterial pressure fell after both sham operation and after protacaval shunt; however, the drop was only significant in the group with the portacaval shunt. In both groups, pulse rate and right atrial pressure changes were inconstant. Cardiac output was the only independently-measured variable that demonstrated a significant change by the multivariant analysis technic. It is proposed that this increase is due to a decrease in peripheral resistance and an increase in venous return; alterations similar to those that accompany a systemic arteriovenous fistula. It is concluded that such an operation would be especially sound in patients with hyperdynamic cardiovascular systems.

11742 DIFFERENTIAL GLUCOSE TOLERANCE: A METHOD FOR DETERMINING PORTACAVAL SHUNT PATENCY.

(E.) Khanna, S. K. (Inst. Postgrad. Med. Educ. & Res., Chandigarh, India), V. K. Saini and T. Das. Canad. J. Surg. 10(3): 325-332, 1967.

An evaluation of the usefulness of conducting differential glucose tolerance tests is reported, in which the glucose level of blood samples from the inferior vena cava were compared with those taken from a peripheral vein, for the purpose of assessing portacaval shunt patency in both dogs and man. After determining fasting glucose levels in both the inferior vena cava and peripheral blood, 50 g of glucose was admin. to 10 mongrel dogs by way of gastric tube and then the glucose values were obtained from these same sites at 20-min. intervals for 2 hr. The same dogs were then subjected to side-to-side portacaval shunt. Differential glucose tests were conducted on the second postoperative day and the dogs were then sacrificed to determine shunt patency. At peak glucose absorption, the max. I-P difference (difference in glucose conc. between the inferior vena cava and a peripheral vein) for control dogs was 6 ± 0.5 mg/% as compared to a value of 38 ± 1.7 mg/% in the same dogs but now with Eck fistulae. Clinically, 5 untreated patients with portal hypertension showed a max. I-P value in the fasting state of 2 ± 0.7 mg/% as compared to a max. I-P value during peak glucose absorption of 10 ± 0.8 mg %. In 5 patients with previously performed portacaval shunt (4 wk. to 1.5 yr. age) differential glucose tolerance was conducted. The max. I-P value during fasting was 3 ± 0.9 mg % as compared with a value of 32 ± 2.7 mg % during peak glucose absorption. This method is recommended as an easy, reliable routine test for determination of the portacaval shunt patency in man.

11743 SELECTIVE TRANS-SPLENIC DECOMPRESSION OF GASTROESOPHAGEAL VARICES BY DISTAL SPLENORENAL SHUNT.

(E.) Warren, W. D. (U. Miami Sch. Med., Fla.), R. Zeppa and J. J. Fomon. Ann Surg. 166(3):437-455, 1967.

Critical analysis of routine portacaval shunt therapy for esophageal varices reveals a lack of success in increasing survival; control of bleeding varices is excellent, but an increased death rate from hepatic complications has negated this achievement. Nonshunting surgical procedures are superior in hepatic protection, but are accompanied by a high incidence of recurrent bleeding. A new operativ procedure is described in which gastrosplenic isolation, gastric devascularization and selective venous shunting is accomplished by an *in situ* spleen and a distal splenorenal shunt (end-to-side anastomosis of the splenic vein to the left renal vein); the rationale of this procedure is to decompress the area critical for control of hemorrhage while maintaining a high pressure intestinal venous system and preserving portal flow to the liver. This operation was performed on 6 patients (3 of each sex; 40-69 yr. old) with bleeding esophageal varices; in 4 a distal splenorenal shunt with gastrosplenic isolation was done, while in 2 the stomach was devascularized but the spleen was left in place; 2 of the

tients subsequently died, but the shunt was
tent in each. Successful accomplishment of
e above-mentioned goal was demonstrated
diographically, with diversion of splenic
ow through a distal splenorenal shunt, while
perior mesenteric flow continued to perfuse the
ver; the proposed metabolic advantage was
nfirmed by a markedly superior response to
otein tolerance testing. From these
eliminary studies it is suggested that use of
s type of procedure is indicated in patients
th high vol. portal flow to the liver; typical
amples are seen in early cirrhosis with
rked splenomegaly and in so-called idiopathic
rtal hypertension.

744 CALCIFICATION IN THE LIVER AND PORTAL
SYSTEM. (E.) Haddow, R. A. (St.
rtholomew's Hosp., London) and R. A. Kemp-Harper.
n. Radiol. 18(3):225-236, 1967.

ree patients are described with portal vein
cification; this was associated with cirrhosis
1 patient and portal hypertension due to
rombosis of the portal vein in the others.
addition, 3 patients with calcification in
e liver are described; in 1 patient this was
e to a primary carcinoma of the liver, in
e second to a bile duct carcinoma and in
e third, calcification occurred in a gumma.
e differential diagnosis of hepatic calcifica-
on is discussed in detail, including calcifica-
on in a hydatid cyst, liver metastases,
mary liver tumors, hepatic artery aneurysms,
er abscess, tuberculous or histoplasmosis
dules, brucellosis granulomata, gumma and
atic stones. The significance of finding
cification in a cirrhotic liver is emphasized,
ce this is strong presumptive evidence of the
elopment of a malignancy.

745 LOCALIZED "RADIATION HEPATITIS" AS
DEMONSTRATED BY SCINTILLATION SCANNING.
) Concannon, J. P. (Allegheny Gen. Hosp.,
tsburgh, Pa.), A. Edelmann, J. C. Frich, Jr.
G. Kunkel. Radiology 89(1):136-139, 1967.

ourse of radiotherapy for malignant neoplasm
patients with malignancy of the testis and
omen with Stage II Hodgkin's disease) was
lowed by inj. of radioactive colloidal Au
subsequent liver scinti-scanning. Three
treatment liver scans in 3 patients were
mal, while definite defects were observed in
post-treatment scans obtained from all 6
ients. These defects were characterized by
uced radioactivity in those areas where
radiation portals crossed the liver.
iotherapy levels ranged from 4000-5000 rads
no symptoms of "radiation" hepatitis were
ed. There were no uniform changes evident
liver function and the role of chemotherapeutic
nts in the possible etiology of "radiation"
atitis was excluded since 3 of the patients
e given only radiotherapy. It is thought that these defects may represent either the direct radiation effects on the function of Kupffer cells or perhaps radiation effects on the liver parenchyma which might prevent the movement of colloidal Au particles to the Kupffer cells.

11746 DETERMINATION OF INDOCYANINE GREEN CLEARANCE BY DICHROMATIC EAR DENSITOMETRY AS A MEASURE OF LIVER FUNCTION. (Ger.) Paumgartner, G. (U. Clin. Vienna), J. Longueville and C. M. Leevy. Wien. Z. Inn. Med. 48(6):227-235, 1967.

Indocyanine green clearance has been used as a test of liver function in the same way as BSP clearance; this nontoxic dye is excreted from the liver in the same manner, and has an absorption spectrum at 800 mμ which permits the continuous measurement and recording of its blood conc. by an ear densimeter. This method was tested on 10 healthy subjects between the ages of 20 and 60 yr. with normal liver histology, and on 44 patients in the same age group with diagnoses of hepatopathologies secured by biopsy (12 cases of viral hepatitis, 12 of fatty liver, and 20 of liver cirrhosis). A dichromatic ear densimeter was used; the instrument was calibrated against a spectrophotometrically-measured conc. of the dye. During the test, blood samples were obtained from indwelling cannulae; the dye conc. in the plasma was established by spectrophotometry. The clearances obtained by the 2 methods (densimetry and direct measurement of dye conc. in plasma) were identical. Two conc. of dye were used; 0.5 mg/kg and 5 mg/kg; clearance measurements were equally precise with the 2 conc. Clearances accurately reflected the degree of liver damage as assessed by study of biopsies. The sensitivity of the method depends upon the conc. of dye used; mild abnormalities of hepatic function require a higher conc. (e.g., 5 mg/kg) whereas in severe liver disease 0.5 mg/kg is sufficient.

11747 COMPARATIVE INVESTIGATION ON THE HEPATIC BLOOD SUPPLY IN DOGS WITH THE INDOCYANINE GREEN METHOD AND THE HENSEL HEAT-CONDUCTING PROBE WITH LIGATURE OF THE HEPATIC ARTERY. (Ger.) Bär, U. (U. Clin. Gottingen, Germany), J. Boettcher, U. Fiedler, H. E. Hoffmeister and C. E. Zöckler. Z. Gastroent. 5(4):222-227, 1967.

Liver blood flow was measured by the indocyanine green method and the Hensel heat transducing probe in 9 dogs (14-16 kg) before and after complete ligation of the hepatic artery. Blood flow in the left lobe of the liver was also determined by these methods. The vascular system of the liver tissue was examined histologically. The blood supply to the liver determined by the dye method in 9 anesthetized dogs av. 21.9 ml/kg/min. or 437 ml/min. prior to ligation. A decrease in blood flow occurred immediately after ligation followed by a compensatory rise. With the dye method the range of the increased blood flow was so great that it was statistically insignificant. The Hensel probe showed an av. fall in 9 animals of 35% in blood flow 2 min. after ligation of the artery with a compensatory rise of about 15% 6.8 min. after ligation; this compensatory rise (presumably due to increased relative portal vein blood pressure) tended to establish a new level of blood vol. flow. The same sequence was found for the left lobe as for the whole liver. No correlation was established between changes in blood flow and the histologic cross-sectional areas of blood vessels.

11748 CLINICAL EXPERIENCES WITH SULFOBROMOPHTHALEIN IN LIVER DIAGNOSIS. (Ger.) Lemke, E. (Reg. Hosp., Potsdam, Germany). Z. Aerztl. Fortbild. (Jena) 61(16):813-816, 1967.

The BSP test was admin. to 750 patients with liver damage of different etiologies. The activity of SGOT and SGPT, serum Fe level, the sedimentation rate, and the thymol precipitation test were also given to these patients for comparison and evaluation of the BSP test. Electrophoresis of serum proteins was also done for the entire group. Among 134 with persistent hepatitis, among 142 recently recovered from acute hepatitis, in 61 with chronic hepatitis and 77 with decompensated liver cirrhosis the BSP test indicated a pathological condition in all cases. In 94 cases of compensated liver cirrhosis the test showed pathology in 92.5% and a normal state in 7.5%. Among 65 with fatty livers the corresponding percentages were 90.7 and 9.3. A pathological condition was discovered by the test in 94.3% of 83 individuals with cardiac insufficiency and decompensated hypertension, but in only 70% of 53 with acute cholangitis and in only 26.8% of 41 with liver metastases. None of the other tests employed were nearly as accurate. Numerical values were not given for the other tests. A chart of these tests in terms of positive, negative, normal, elevated, and other values is presented.

11749 INFLUENCE OF SINGLE CHOLERETICS UPON THE COURSE OF THE SULFOBROMOPHTHALEIN EXCRETION CURVE RECORDED IN VIVO. (Dut.) Versieck, J. (Acad. Hosp., Gent, Belgium), J. Verbeke and F. Barbier. T. Gastroent. 10(1): 41-55, 1967.

The excretion of BSP with and without an admin. choleretic in the bloodstream was recorded by an automatic analyser in the heparinized blood (10,000 U) of patients inj. i.v. with 5 mg/kg of BSP. Test curves without admin. choleretics showed excellent reproducibility in 12 patients with a wide diversity of pathologies such as cholelithiasis, hypertension, diabetes, neuroses, colitis, fatty liver, liver cirrhosis, chronic hepatitis, and others. The choleretics and dosages used were Na-dehydrocholate (1.5-4.0 g), 7-morpholino-ethyl-8-benzyltheophylline (1 g), Na cyclobutyrate (2-4 g), and phenyldimethylaceti acid (2-4 g). The results were not uniform. Where Na dehydrocholate markedly prolonged BSP clearance from the plasma, phenyldimethylacetic acid did not produce any change; 7-morpholinoethyl-8-benzyl theophylline prolonged plasma excretion of the dye only during the second part of the curve; and Na cyclobutyrate produced results showing acceleration, no change, or delay in the removal of BSP from the plasma.

11750 A COMPARATIVE EVALUATION ASSAY OF THE LIVER DAMAGE IN THE COURSE OF TOXEMIA OF PREGNANCY AND IN THE VIRAL INFECTIOUS HEPATIT IN PREGNANCY. (Pol.) Herbst, J., B. Nowakowska and J. Wencel. Ginek. Pol. 37(12):1309-1312, 19

Thymol tests, serum transaminase activity, serum uric acid levels, serum bilirubin levels and urinary urobilinogen determinations were made on 51 women with late toxemia of pregnancy and results compared with those obtained from 37 pregnant women with viral hepatitis. Serum transaminase activity was only slightly elevated in late toxemia of pregnancy in contrast to high activity among pregnant women with viral hepatit Thymol test values were also slightly elevated, but were lower than in viral hepatitis. Serum uric acid levels were significantly elevated in toxemia of pregnancy with a mean value of 6.6 mg while in viral hepatitis the levels were within normal limits (3.6 mg%). Urinary urobilinogen w elevated in 33% of patients with toxemia of preg nancy indicating changes in the liver. It is co cluded that even in the absence of clinical symp toms (jaundice) liver function disturbances occu in many cases of late toxemia of pregnancy and c be demonstrated by laboratory tests.

11751 IMMUNOCHEMICAL DIAGNOSIS OF PRIMARY CANCER OF THE LIVER. (Rus.) Assekritova, I. V. (Inst. Exp. Clin. Oncol., Moscow), G. I. Abelev, N. A. Kraevskii, S. D. Perova and N. I. Perevodchikova. Vestn. Akad. Med. Nauk SSSR 22(5):75-81, 1967.

Parenchymal liver cells of rat or mouse embryos and those of up to 3-wk.-old animals are capabl of synthesizing α_f-globulin, a serum component not found in the sera of the adult, healthy animals. Hepatoma cells are able to synthesize this protein in the adult animals and to releas it into the serum. The α_f-globulin content of serum samples collected from 70 patients with hepatic tumors was determined by precipitation in agar-gel and immunoelectrophoresis. Sera against human α_f-globulin were prepared by repea inj. into rabbits of serum collected either fro human embryos or from newborn children. The antisera were absorbed by normal human sera. T α-globulin fraction of human embryo serum serve as an antigen in the reactions. Of the 70 patients 18 had primary cancer of the liver, 2 be nign hepatic tumors, and 50 metastatic hepatic tumors. The control groups consisted of 58 atients with various hepatic tumors, and of 60 atients with hepatic diseases other than tumor. era of 10 of the 18 patients with primary cancer f the liver were positive for α_f-globulin. This lobulin was found mostly in the sera of patients ith hepatocellular structure of primary liver ancer (7 of 8). Sera of 4 of 23 patients with eratoblastoma of the testis, containing elements f embryonic cancer or of seminoma and chorio- pithelioma, were also positive for α_f-globulin. ne explanation of this finding remains obscure. era of patients from other groups were all nega- ive for α_f-globulin.

1752 THE ACTION OF THE CYTOSTATIC METHOTREXATE ON THE WATER CONTENT AND DRY EIGHT OF NUCLEUS AND CYTOPLASM OF REGENERATING IVER CELLS IN THE RAT AFTER PARTIAL HEPATECTOMY. Ger.) Schiemer, H. G. (Goethe U., Frankfurt/M., ermany), G. Günther and D. Sina. Frankfurt. Z. ath. 76(4):427-434, 1967.

f 8 rats (132-258 g) where the ventral lobe f the liver was excised, 5 were inj. i.p. with .5 ml of 2% methotrexate soln. 24 hr. after artial hepatectomy. All animals were killed 48 r. after operation and liver tissue from each was ixed; some fresh liver tissue was prepared as luid mounts in Tyrode-0.5% gelatin soln. for tudy under the interference microscope. The iddle optical sections of the nucleus and of the ytoplasm of cells were measured from planimetric rawings made under monochromatic light. Similar easurements were made of the fixed (e.g., dehy- rated) liver cells. Using formulae derived by ne author, the wet vol. (in μ^3) and the dry wt. 10^{-12} g) of cells, nuclei and cytoplasm were alculated. In normal regeneration a considerable ncrease occurred in vol. of nucleus from 409 to 76 and of cytoplasm from 6780 to 8340; in regen- ration with methotrexate the nuclear vol. in- reased to 474 and the cytoplasmic vol. to 8230. ry wt. rose from 57.5 to 63.9 (normal regenerat- ng nucleus) and from 563 to 689 (normal re- enerating cytoplasm). Dry wt. in regeneration ith methotrexate went to 58.9 (nucleus) and 626 cytoplasm). Vol. increases under the influence f methotrexate (both nuclear and cytoplasmic) ere similar to those in normally regenerating ells. The increase in dry wt. of the cytoplasm nd, especially, of the nucleus (less than 25% of he normal) was sharply curtailed by methotrexate, ndicating a reduction of synthesis. All the alues are statistically significant.

11753 CIRRHOSIS AND PRIMARY CANCER OF THE LIVER. COMPARATIVE STUDY IN TOKYO AND INCINNATI. (E.) Mori, W. (Tokyo Med. Dent. oll.). Cancer 20(5):627-631, 1967.

f 3232 autopsies reviewed in Tokyo, an overall ncidence of 59 cases (1.8%) of primary hepatic ancer and 124 cases (23.4%) of liver cirrhosis as revealed. These cases of primary liver cancer nvolved 29 patients with and 30 patients without liver cirrhosis with 42 of the tumors being of hepatocellular origin (37 in males and 5 in females), while 15 were determined to be of cholangiocellular origin. The remaining 2 cases consisted of 1 case of hepatoblastoma and 1 case of hepatic mixed tumor. These findings were comparable to those reports from Asian-African areas. Compared to findings collected in Cincinnati by E. A. Gall, both studies reflected the fact that nonspecific cirrhosis (either postnecrotic or posthepatitic) was the predominant complication of hepatocellular carcinoma. Nutritional and other specific cirrhosis showed no significant concomitant association with hepatocellular carcinoma. The association of cholangiocellular carcinoma and cirrhosis was absent in the Tokyo study, but was as high as 45% in the Cincinnati study. Postnecrotic and posthepatitic cirrhosis (hepatoma-related) are more prevalent in Tokyo and this may account for the higher incidence of primary hepatic cancer in that city. Nutritional cirrhosis (hepatoma-unrelated) was found to be more prevalent in Cincinnati. Congenital atresia was responsible for 17 of 25 cases of biliary cirrhosis in infants autopsied in Tokyo.

11754 GLYCOGEN STORAGE DISEASE IN ISRAEL. A CLINICAL, BIOCHEMICAL AND GENETIC STUDY. (E.) Levin, S. (Kaplan Hosp., Rehovoth, Israel), S. W. Moses, R. Chayoth, N. Jagoda and K. Steinitz. Israel J. Med. Sci. 3(3):397-410, 1967.

Over the last 13 yr. in Israel, 49 cases of glycogen storage disease have been diagnosed, of whom 26 have been typed as to their specific enzyme deficiency. All of the latter were in the non-Ashkenazi Jewish community (of North African origin) and 73% had a deficiency of amylo-1,6-glucosidase (debrancher enzyme). This figure is to be compared with 56% from Holland, 25% from Belgium, 21% for U.S.A. and 8% from Sweden. In Israel, the incidence among Jews of European background was about the same as that reported for Sweden. In 7 cases of the amylo-1,6-glucosidase deficiency, reduction in glucose-6-phosphatase activity was also evident. It is suggested that this reduced activity is secondary to a regulatory gene abnormality which brought about the deficiency in the debranching enzyme and not due to a second structural gene defect. All efforts to discover a common ancestry or interrelationship between the 11 families involved was unsuccessful but in 9 the parents were blood relations. The data suggested an autosomal recessive made of inheritance. The glycogen content of liver (range of 4.9-17.1 g/100 g wet tissue) and muscle (ranged between 2.8-11.0 g/100 g) was abnormally high in all cases examined. Fasting hypoglycemia was present in 19 of 22 and hyperlipidemia in 9 of 13 tested. A diabetic-like curve was obtained in all of 14 given the glucose tolerance test and elevation of blood glucose was seen in all of 16 given the galactose tolerance test. Symptomatic hypoglycemic attacks were reported in 14 cases, but generally the attacks were mild.

11755 HARTNUP DISEASE. (E.) Oyanagi, K. (Aomori Prefect. Cent. Hosp., Japan), M. Takagi, M. Kitabatake and T. Nakao. Tohoku J. Exp. Med. 91(4):383-395, 1967.

The first cases of Hartnup disease in Japan (2 typical cases and 6 proposed carriers through 3 generations) are reported. The first patient evaluated, a 19-yr.-old girl, manifested typical bilateral dermatitis similar to pellagra on her extremities and face and, also, a 20-day history of ataxic gait. Paper chromatographic studies of her urinary amino acid and indole excretion was abnormal with levels of free amino N_2 being 1000 mg/day and also marked spots of indican, tryptophan, indoleacetic acid, indoleacetylglutamine and indoleacrylglycine being noted. Marked improvement was observed, with loss of dermatitis and ataxic gait, after 6 mo. therapy with nicotinamide. The second patient evaluated, a 21-yr.-old boy, also showed characteristic symptoms of Hartnup's disease. This second patient, however, recovered from his ataxic gait without nicotinamide therapy. Paper chromatographic studies and tryptophan-loading tests were conducted on urine samples taken from these 2 patients' parents, siblings, maternal first cousins, and maternal and paternal grandmothers and grandfathers. Indicanuria and increased excretion of tryptophan and indoleacetic acid were noted in 2 siblings, 2 maternal first cousins and both grandfathers. However, no external signs of Hartnup;s disease were observable. It is suggested that these latter patients may represent carriers of this disease.

11756 REPLANTATION OF THE LIVER IN DOGS. (E.) Alican, F. (U. Mississippi Med. Ctr., Jackson) and J. D. Hardy. J. Surg. Res. 7(8): 368-375, 1967.

Liver replantation was performed in 60 dogs in an attempt to examine the effects of orthotopic autotransplantation as a prelude to the investigation of the immunological factors involved in orthotopic homotransplantation. Thirty-seven dogs survived longer than 3 days, and 15 longer than 1 mo. At the time of report, 3 dogs still survive at approx. 18 mo., and 1 delivered a litter of 12 puppies. Certain useful modifications of previously-described liver transplantation technics were noted. The excised liver was perfused with cold soln. without delay, but total body hypothermia was avoided. During replacement of the liver, the portal and caval blood was returned to the heart by means of a single external bypass from the caudal end of the divided portal vein to the external jugular vein; after the portal vein and infrahepatic vena cava had been temporarily joined by an autogenous vein graft. The arterial supply was restored by end-to-end anastomosis of the common hepatic artery. The incidence of vascular thrombosis was strikingly low. Serum bilirubin levels remained normal in most animals. Blood glucose levels frequently declined during the first postoperative day, but then usually remained normal. The SGOT level rose immediately in most animals, but usually declined to normal after 2 wk. in chronic survivors. Albumin decreased and globulin increased in long-term survivors. The serum alkaline phosphatase level rose within 48 hr. after operation and usually declined in several days, but in some cas it remained elevated for several mo. Development of hepatic venous outflow block, abnormal bleedin or subsequent ascites was rarely encountered when the organ was well-preserved with cold soln. and trauma avoided by gentle handling. In contrast, when cold preservation was inferior or traumatic manipulation did occur, not only these complications but subsequent liver abscesses due to focal necrosis were noted. The patency of the vascular anastomoses was good in most animals; thrombosis of the hepatic artery occurred in only 5 animals, portal vein thrombosis occurred in 2 and vena caval thrombosis in 3. It is suggested that thes results provide a description which was formerly lacking of the course of longterm survivors of canine liver replantation.

11757 COMPARISON OF SOME INDICES RESULTING FROM EXTRACORPOREAL PERFUSION WITH THE USE OF HOMO- AND HETEROLOGOUS LIVER. (Pol.) Alichniewicz, A. (3rd Surg. Clin., Lodz, Poland), J. Martin, H. Zalech, A. Joss, A. Dziewałtowska, R. Markert and M. Borchardt. Pol. Przegl. Chir. 39(3):225-229, 1967.

Extracorporeal hepatic perfusion experiments were performed on 20 dogs using homologous and heterologous livers. Ten dogs had the livers of other dogs, 4 had pig's livers and in 6 had calf's livers. Pig's liver was unsuitable causing agglutination of RBC and death of the dogs within 10-20 min. Blood pH decreased 2.3% with homologo liver after 2 hr. of circulation and 1.2% with heterologous (calf's) liver after 4 hr. The hemolysis level av. 28 mg% with homologous but 59% with heterologous liver after 4 hr. O_2 uptake was 35.0% lower with heterologous than homologous circulation after 3 hr. Both homo- and heterologous livers excreted 4-6 ml of bile/h In BSP excretion tests dogs with heterologous liver completely excreted this substance 40 min. sooner than those with homologous liver (60 min. as compared to 100 min.). In NH_3-loading experiments the NH_3 returned to initial levels after 100 min. with homologous and after 70 min. with heterologous livers. Coagulation time increased from 8 min. at the beginning to 28 min. after 2 hr. Electrophoretic studies of plasma proteins showed a slight decrease of albumin but definite increase of the γ-globulin fraction. It is concluded that including homologous or heterologous (calf's) liver into the blood circulation of dogs maintains the principal physiologic function for several hr.

11758 ASSESSMENT OF LIVER FUNCTION IN MICE. (E.) Becker, B. A. (U. Iowa Coll. Med. Iowa City) and G. L. Plaa. Lab. Anim. Care 17(3) 267-272, 1967.

rochemical methods and their limits of normalcy the assessment of liver function in a colony Swiss Webster-type male mice are presented to those who wish to study liver function or evaluate liver function prior to chronic toxty studies or following exposure to disease. ng 3 separate groups of mice the plasma conc. the upper limit of normalcy for bilirubin, and SGPT was 0.1 ± 0.2 mg% and 1.0 mg%, ± 0.7 mg% and 3.1 mg%, and 28 ± 11 U and 61 U, p. No positive responses for urinary bilirubin e obtained in the urine from 30 untreated mice. n cannulation of bile ducts, flow began within 5 min. at the initial rate of 0.04-0.07 ml/hr. continued for some hr. (a few produced bile 48 hr.). This measurement was made by the . inj. of 0.01 ml/g of 0.2% soln. of fluoresn. The following scheme is presented for aining a sample group from a mice colony conting of 900 mice housed 10 in a cage: Take 1 se from each cage and place in a single conner and then after mixing the cages well, select domly 3 groups of 30. One group each is then lyzed for plasma bilirubin, SGPT and BSP levels if no animal in any group exceeds the resp. er limit of normalcy, all members in the origl population are considered to have normal er function.

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See also abstract nos.: 10917,10938,11156,11157,11158,11705

11844 BETA-GLUCURONIDASE IN ACUTE CARBON TETRACHLORIDE DAMAGE TO THE RAT LIVER.

(Ger.) Nilius, R. (Martin Luther U., Halle-Wittenberg, Germany), F. W. Rath and A. Gomez. Z. Ges. Exp. Med. 144(2):157-172, 1967.

Activity of β-glucuronidase was determined in the serum and liver homogenates in white rats (200-250 g) inj. s.c. with 0.5% CCl_4/100 g body wt. in a 50% soln. of sunflower oil, in other rats inj. with oil only and in still other rats (non-inj.) as controls. Animals were killed at 2.5, 9, 24, 32, 48, 72, 96 and 192 hr. after admin. of CCl_4, and the blood and liver obtained. Some of the liver was used for biochemical determination of the enzyme and some for histologic and histochemical studies. After inj. of CCl_4 total β-glucuronidase activity in the liver was reduced to 50% reaching its minimum at the appearance of necrosis (32-48 hr.). With regeneration (after 48 hr.) of the liver cells, the enzyme activity increased in the homogenates. In all phases of CCl_4 admin. serum activity was higher (60-70% of total enzyme activity) than in normal rats (40%). The conc. of β-glucuronidase in the serum increased after inj. of CCl_4 up to 4-5 times normal. A characteristic diphasic enzyme elimination from the serum was noted. A loss of enzyme was observed histochemically in the liver before any structural changes were seen in the hepatic cells; with increasing visual cell damage, enzyme conc. declined. Necrotic cells showed no β-glucuronidase activity. With regeneration, enzyme conc. was restored to normal. These findings agree with the lysosome concept.

11845 CHANGES OF LIVER PARENCHYMAL CELLS FOLLOWING ADMINISTRATION OF ACTINOMYCIN C AND D.

(Ger.) David, H. (Humboldt U., Berlin) and I. Marx. Acta Biol. Med. German. 18(2): 259-273, 1967.

White mice were inj. i.p. or intrasplenically with 0.1-1.0 μg/g body wt. of actinomycin C or D, carcinostatic agents, 1, 2, or 3 times (at 0 hr., 24 hr., and 48 hr.). Liver was excised at different intervals from 45 min. to 72 hr. and prepared for ultramicroscopy. As early as 45 min. after the actinomycin dose, layering of karyoplasmic granules, flocculation with lightening of the background and clumping at the nuclear membrane and around the nucleolus occurred. Concurrent changes took place in the nucleoli: the nucleolonemata and the pars amorpha separated, both staining with osmium. Membrane-like layers surrounded the altered nucleoli separated by a clear area from the karyoplasm; all stages of disintegration of nucleoli were present. The nuclear membrane showed vesicular formation; the number of membrane pores remained normal and some nuclear inclusions were noted. After the second hr. following inj. changes became visible in the cytoplasm. The ribosomes not attached to the membranes were at some distance from them; all cytoplasmic regions had numerous polysomes as well as larger membrane complexes of the granular reticulum. Destruction of reticulum or ribosomes was never observed. The smooth endoplasmic reticulum became altered with small vesicles and with glycogen deposits which increased with increased number of actinomycin inj. After the second hr. the ground plasma became very clear so that the organelles seemed to float in empty space. In some cells the mitochondria were swollen, hyperplastic, lackin matrix substance, and with fragmented cristae. Ring-shaped mitochondria were noted. After 1 o more admin. of actinomycin, microbodies but not cytolysosomes increased in the liver cells. Lysosomes were present in the Golgi field. Osmiophilic granules collected in the space of Disse, the microvilli were decreased in number and swollen and fat globules became common. Th changes result from actinomycin-induced damage to RNA synthesis in turn reducing synthesis of cytoplasmic protein.

11846 VITAMIN E AND STRESS. 4. THE METABOLISM OF D-α-TOCOPHEROL DURING NUTRITIONAL HEPATIC NECROSIS IN THE RAT AND THE EFFECTS OF SELENIUM, METHIONINE AND UNSATURATED FATTY ACIDS.

(E.) Green, J. (Vitamins Ltd., Tadworth, Surrey, England), A. T. Diplock, J. Bunyan, I. R, Muthy and D. McHale. Brit. J. Nu 21(2):497-506, 1967.

Liver necrosis was induced in rats given diets deficient in Se and vitamin E and the metabolis of (^{14}C)D-α-tocopherol was studied during development of the disease. When a torula yeas diet (containing sufficient amount of yeast to provide essential fatty acids) was used, the addition of 5% cod-liver oil fatty acid methyl esters produced only a slight decrease in the time taken to produce the disease, compared to controls given methyl oleate; methionine had little protective effect. The metabolism of th radioactive tocopherol was unaffected by dietar lipid, methionine or Se, and was not influence by the development of necrosis. When a casein diet (devoid of fat and containing insufficient Se to prevent liver necrosis) was used, the addition of small amounts of linoleic acid to the diet (as 2% maize oil fatty acid methyl esters) decreased the time required to produce the disease and increased its incidence. However, metabolism of the radioactive tocopherol was independent of dietary lipid or Se. It is suggested that either Se or vitamin E may be necessary for effective utilization of the rat' requirement for linoleic acid.

11847 STUDIES ON THE INFLUENCE OF 7-[2-HYD
3(N-2-HYDROXYETHYL-N-METHYLAMINO)-PR
1,3-DIMETHYLXANTHINE-PYRIDINE-3-CARBOXYLATE (X
THINOL NICOTINATE) ON THE LIPID INFILTRATION I
THE RAT LIVER AFTER CHRONIC INTOXICATION BY CA

TRACHLORIDE AND ALCOHOL. (Ger.) Brenner, G.
. A. Wulfing Co., Dusseldorf, Germany).
zneimittelforschung 17(8):991-993, 1967.

ite rats in 6 groups were used in these studies;
) normal controls; (2) animals inj. s.c. with
x 770 mg CCl_4 in olive oil/kg/wk.; (3) rats
j. as in Group 2 with CCl_4 plus 500 xanthinol
cotinate/day in the drinking water; (4) animals
min. CCl_4 as in Group 2 for 2 and 5 wk.
llowed by 500 mg xanthinol nicotinate/kg/day
r 3 days in the drinking water plus 300 mg/kg/day
v.; (5) animals maintained on 15% ethanol in
ace of drinking water for 3 mo.; (6) rats
intained for 3 mo. on 15% ethanol followed by
tubation of 500 mg xanthinol nicotinate/kg,
ice/day for 3.5 days. The livers were extracted
r total lipids, and the amount of unsaturated
tty acids determined; in the animals receiv-
g alcohol the unesterified fatty acids of the
asma were also measured. Fatty degeneration of
e liver induced by CCl_4 was reduced by 55% by
e concomitant admin. of xanthinol nicotinate.
ter 5 wk. treatment with CCl_4 the lipid
filtration of the liver was decreased by 25%
the therapeutic admin. of xanthinol nicotinate.
tty degeneration of the liver resulting from
ronic intake of alcohol was reversed and the
ver lipid content reduced below normal values
ter 3 days treatment with xanthinol nicotinate.
e compound also decreased the free fatty acids
the blood plasma of rats after chronic alcohol
toxication.

48 BIOTIN DEFICIENCY AND OROTIC ACID FATTY LIVER IN THE RAT. (E.) Sarma,
S. R. (U. Pittsburgh Sch. Med., Pa.) and
Sidransky. J. Nutr. 92(3):374-376, 1967.

male Sprague-Dawley and Wistar rats were
vided into 2 groups: rats fed a basal diet
d rats fed a biotin-deficient diet, both
libitum for 10 wk. The basal diet was com-
sed of 20% vitamin-free casein, 11% autoclaved
g white, 5% corn oil; 4% salts, 5% vitamin-
crose mixture and 55% sucrose, and it also
ntained 20 μg biotin/100 g diet. The biotin-
ficient diet was identical with the basal diet,
cept that no biotin was added and 11% raw egg
ite (spray-dried) was used. After 10 wk., the
groups were further subidivided according to
e diet that was force-fed for 3 or 6 days.
imals fed the basal diet were divided into a
oup fed just the basal diet, and a group fed
e basal diet containing 1% orotic acid. Animals
d the biotin-deficient diet were divided into
group further fed the biotin-deficient diet
one, one fed this diet containing 1% orotic
id and another group fed the biotin-deficient
et containing 1% orotic acid and in addition,
0 μg DL-biotin s.c. during the first day of
rce-feeding. All animals force-fed the orotic
id-containing diets developed fatty livers.
ese results indicate that biotin deficiency of
self does not influence the development of
tty liver due to orotic acid. Dietary consumption must be considered as an influencing factor in the pathogenesis of nutritionally-induced or related fatty liver.

11849 6-AZAURACIL DERIVATIVE AS LIVER FUNCTION TEST IN THE COURSE OF CYCLOPHOSPHAMIDE TREATMENT. (E.) Timar, M. (Inst. Chem. Pharm. Res., Bucharest), I. Hädrich, E. Banu, I. Nitelea and M. Teodorescu. Farmaco [Prat.] 22(7):403-409, 1967.

A dose of 200 mg/kg of 5-mercapto-6-azauracil was admin. s.c. 9 days before and 1, 3 and 8 days after i.v. admin. of a single dose of 130 mg/kg cyclophosphamide to male Wistar rats, and the content of the drug and its metabolites in urine was assessed chromatographically. Parallel tests were performed with BSP, using a 0.1% soln. admin. i.v., 0.5 ml/100 g animal. The mechanism of 5-mercapto-6-azauracil metabolism was studied by assessing the effect of this substance (500 mg/kg for 3 days) on the duration of sleep produced by hexobarbital, 50 mg/kg, admin. i.v. The results indicated that repeated admin. of 5-mercapto-6-azauracil stimulates drug-metabolizing enzymes in the liver, this being shown by shortening of the duration of hexobarbital anesthesia and by modifications in the chromatogram of the metabolites in the urine; the latter, appearing as black spots, decreased after repeated admin. of 5-mercapto-6-azauracil, and there was a parallel increase in the number of blue spots, indicating accelerated elimination of the drug. In intoxication with cyclophosphamide, elimination of 5-mercapto-6-azauracil was maintained at a high rate, but the proportion of unaltered substances and its metabolites was different. Hence in the course of cyclophosphamide intoxication, elimination of 5-mercapto-6-azauracil maintained the same character as in controls, but its metabolism was modified. These metabolic differences due to liver function were not shown by the BSP clearance studies. It is concluded that 5-mercapto-6-azauracil is a useful tracer in the investigation of metabolic capacity, as affected by drug therapy, and that it may afford indications concerning the metabolic impairment of the liver.

11850 EFFECTS OF NUCLEIC ACID PRECURSORS ON LIVER INJURIES. II. THE INFLUENCES OF AICA AND AICA OROTATE ON METABOLISMS IN LIVER INJURIES AND THEIR CLINICAL SIGNIFICANCES. (E.) Hashimoto, S. (Western Reserve U., Cleveland, Ohio). J. Vitamin. (Kyoto) 13(1): 19-25, 1967.

Adult male Wistar rats were maintained on a low protein diet for a period of 10 wk. in order to induce liver injuries (fatty liver and slight fibrogenesis); the animals were then divided into 3 groups and were maintained for a period of 4 wk. on a 30% casein diet alone (Group 1, the controls); a control diet supplemented with 0.1% 4-amino-5-imidazole-carboxamide (Group 2) and a control diet supplemented with 0.2% 4-amino-5-imidazole-carboxamide orotate (Group 3). In Group 1, the urinary acetone body and pyruvate, and liver neutral lipid and hexosamine, contents were rapidly restored, while urinary α-ketoglutarate increased after showing an initial tendency to decrease. The iodine numbers of liver phospholipid and neutral lipid, and liver collagen content, did not show any improvement. In Group 3, decrease of the urinary hydroxybutyrate was more marked than in the control, and iodine number of liver neutral lipid increased rapidly; decrease of liver collagen was prompt. Iodine number of the liver phospholipid decreased, and urinary keto acids showed a transient higher level than in the controls. In Group 2, the liver collagen level decreased slightly and iodine number of liver lipid was markedly low; decrease of urinary acetone body and keto acids was more retarded than in the controls. In summary, addition of sufficient amounts of 4-amino-5-imidazole-carboxamide orotate to a high protein diet may prompt recovery of liver injuries induced by a low-protein diet; in view of the equilibrium between purine and pyrimidine in nucleic acid metabolism, 4-amino-5-imidazole-carboxamide is useful. In addition, 4-amino-5-imidazole-carboxamide was admin. to 6 patients with chronic hepatitis and 3 with liver cirrhosis; 4-amino-5-imidazole-carboxamide orotate was given to 1 patient with acute hepatitis (in convalescence), 12 patients with chronic hepatitis, 6 with liver cirrhosis and 2 with Banti's syndrome. Both agents were admin. p.o. for 1-5 mo. in doses of 0.6 g/day divided into 3 portions after meals. In the 4-amino-5-imidazole-carboxamide-treated group, approx. half of the patients showed alleviation of subjective symptoms, diminution of swelling of the liver, decrease of urinary urobilinogen excretion and improvement of BSP clearance; in some there was improvement of serum protein fraction and Kunkel values. In the 4-amino-5-imidazole-carboxamide-orotate-treated group, alleviation of subjective symptoms and swelling of the liver were not evident, but the urinary urobilinogen excretion decreased markedly, and BSP clearance and Kunkel value improved in approx. half the patients. Improvement of serum icterus index and serum protein fractions and elevation in choline esterase activity were noted in 33% of the patients. Improvement after 4-amino-5-imidazole-carboxamide orotate was more pronounced in patients with chronic hepatitis than in those with liver cirrhosis.

11851 EFFECTS OF L-ASPARAGINE AND RELATED COMPOUNDS ON THE HEPATIC FATTY INFILTRATION AND NECROSIS INDUCED BY ETHIONINE AND CARBON TETRACHLORIDE.

(E.) Alexander, N. M. (Yale U. Sch. Med., New Haven, Conn.), R. Scheig and G. Klatskin. Biochem. Pharmacol. 16(6): 1091-1097, 1967.

Female Sprague-Dawley rats were given either DL-ethionine (100 mg/100 g, admin. either by i.p. inj. in 2-5 doses or by gastric intubation as a single dose) or CCl_4, admin. s.c. in a total dose of 0.20 or 0.26 ml/100 g in 2 equal doses 2 hr. apart. The protective effect of L-asparagine (at total dose levels ranging from 80-400 mg) and of other amino acids was studied. I.p. inj. DL-ethionine produced a 2-5-fold increase in hepatic triglycerides within 5 hr. which persisted for at least 24 hr.; ethionine admin. p.o. was equally effective in raising the hepatic triglyceride level. L-Asparagine prevented fatty infiltration of the liver induced by i.p. ethionine, but L-asparagine alone had no effect on hepatic triglyceride conc. Also, L-glutamine, glycine and L-methionine were protective in effect, but L-aspartic acid, L-lysine L-threonine and α-ketoglutaric acid afforded no protection against ethionine-induced fatty infiltration of the liver. Within 5 hr. after s.c. admin. of CCl_4 there was a 2.5-fold increas in hepatic triglycerides; this effect was prevented by i.p. inj. of L-asparagine, L-glutamine L-glutamic acid or DL-methionine, but not by i.p inj. of L-aspartic acid or glycine. L-Asparagin did not prevent CCl_4-induced hepatic necrosis. Chromatographic analysis of the hepatic lipids after CCl_4 admin. revealed that the i.p. inj. of L-asparagine had prevented the expected alterations in the fatty acid pattern indicative of lipid mobilization from adipose tissue.

11852 UPTAKE OF Zn^{65} BY RAT LIVER DAMAGED BY CCl_4.

(E.) Saldeen, T. (U. Lund Sweden) and U. Stenram. Frankfurt. Z. Path. 77(1):61-66, 1967.

The uptake of ^{65}Zn was increased in the liver of Sprague-Dawley rats which had received i.p. 0.02 ml of CCl_4 2 days before the inj. of the Zn. When the Zn was admin. as the chloride it was absorbed from the site of inj. much slower than if given as the citrate. One hr. following the inj. of the radioactive Zn the citrate product showed a marked increase in activity, whereas it was not until 24 hr. later that this increase was seen with $ZnCl_2$. No difference was found in either group 4 days after the inj. Autoradiography showed that the increase in uptake of Zn occurred in the damaged, centro-acinic parts of the liver. When 1 ml of 1% trypan blue soln. was inj. i.v. 3 hr. prior to the s.c. inj. of 0.2 ml of ^{65}Zn citrate in CCl_4-treated rats it had no effect on the uptake of Zn by the liver which supports the assumption that ^{65}Zn-uptake occurs at least mainly in the cells of the liver parenchyma and not in the Kupffer cells.

11853 EFFECT OF ENVIRONMENTAL TEMPERATURE ON FATTY LIVERS PRODUCED BY VARIOUS HEPATOTOXIC AGENTS IN RATS.

(E.) Radomski, M. W. (Defence Res. Med. Lab., Toronto, Canada) and T. Orme. J. Nutr. 92(1):19-22, 1967.

Wistar rats of both sexes were divided into 4 groups of 10-14 rats for each hepatotoxic agent

ted: control and treated groups at each of
2 environmental temperatures tested, 22° and
they were housed at these 2 temperatures for
days before treatment and provided with food
water *ad libitum*. Three experimental diets
the following compositions were used: 1)
t A: 15% vitamin-free casein; 0% soy protein;
corn oil; 0% lard; 71% sucrose; 2.8% non-
ritive fiber; 4% salt mix; and 2.2% vitamin
plement; 2) Diet B, 20%, 0%, 10%, 0%, 61%,
%, 4% and 2.2%, resp.; and 3) 10%, 10%, 0%,
, 51%, 2.8%, 4% and 2.2%, resp. Rats given
ionine and orotic acid were fed Diet A, and
other groups received Diet B; choline
iciency was produced by feeding the rats
t C. Orotic acid at the level of 1% of the
t was admin. to the female rats for 14 days,
the other hepatotoxic agents were given to
rats after 14 days on the experiment. The
lowing dosages and routes of admin. for the
er agents were used: CCl_4 in mineral oil
l vol./vol.), 0.5 ml of mixture/100 g/female,
stomach tube; thionine, 25 mg/ml of water,
mg/female, i.p., 5 times 12 hr. apart; 4-
nopyrazolopyrimidine, 10 mg/ml of water,
g/100 g/male, i.p., 2 times 24 hr. apart, and
anol, 50%, 1.2 ml/100 g/female by stomach tube.
pective control groups at both temperatures
eived equal dosages of the solvent used for
h agent. Fatty liver was produced by each of
treatments in the rats housed at 22°. A
perature of 4° prevented the development of
ty liver in the rats fed the choline-deficient
t in confirmation of previous results, but
no effect on fatty livers caused by the admin.
CCl_4, ethionine, 4-aminopyrazolopyrimidine
orotic acid. Cold exposure significantly
mented the degree of fatty infiltration of the
er produced by 4-aminopyrazolopyrimidine. A
tial lipotropic effect of cold exposure was
rved in rats treated with ethanol.

4 LIVER FUNCTION: POSTPRANDIAL UREA
NITROGEN ELEVATION AND INDOCYANINE
N CLEARANCE IN THE DOG. (E.) Vogin, E. E.
ck Sharp & Dohme Res. Lab., West Point, Pa.),
. Skeggs, D. L. Bokelman and P. A. Mattis.
c. Appl. Pharmacol. 10(3):577-585, 1967.

thod for evaluation of liver function, based
the postprandial elevation of urea N in the
m of beagle dogs of both sexes, is described.
sy specimens were obtained, and alkaline
phatase, SGOT and indocyanine green clearance
er i.v. admin. of 0.5 or 1.0 mg/kg) also
determined after the induction of liver
ry by CCl_4 (2 ml/kg in 2 ml/kg of mineral
admin. by gavage for 2 successive days) or
onine (25 mg/kg, admin. p.o. once a day, 5
/wk., for 4 wk.). The postprandial elevation
rea N was significantly reduced by both
totoxic agents. In ethionine-treated animals
depression of postprandial urea N elevation
the most effective of the clinical diagnostic
s, indicating the onset of hepatotoxicity.
ver, indocyanine green clearance was the most satisfactory test for determining residual hepatic damage during recovery studies after CCl_4 admin. These studies demonstrate that urea N levels of serum increase in response to protein intake in the beagle, and that either rapid (CCl_4) or slow (ethionine) induction of liver damage can be assessed by measurement of the reduction in postprandial rise of serum urea N.

11855 FLUOROMETRIC DETERMINATION OF FREE AND CONJUGATED BROMSULPHALEIN (BSP) IN EXPERIMENTAL LIVER INJURY. (E.) Rodriguez Garay, E. (Nat. Inst. Health, Haedo, Argentina), V. Pérez and M. Royer. *Acta Physiol. Lat. Amer.* 17(1):68-75, 1967.

A sensitive method for the detection of BSP conjugates is described, based on the red fluorescence which BSP spots show under light after being separated by paper chromatography and treated with a 5% KOH ethanol soln. This technic allows the determination of the presence of quantities of BSP as minute as 0.1 µg. Small quantities of material may also be used, a practical advantage in working with laboratory animals. An additional advantage is avoidance of the loss of dye which occurs when it is eluted from the chromatogram. This technic is particularly useful for the determination of serum conjugates, the proportions of which are not as elevated as in bile. In preliminary studies, determinations of BSP fractions by the fluorometric method and by spectrophotometric titration of the eluted spots were in agreement. In contrast, when small samples were used, or when conjugated BSP fractions were not elevated, determinations of their proportions after elution were not particularly accurate.

11856 EFFECT OF ETHIONINE ON THE ULTRASTRUCTURE OF DEVELOPING LIVER CELLS. (E.) Wood, R. L. (U. Minnesota Med. Sch., Minneapolis). *J. Ultrastruct. Res.* 19(1-2): 100-115, 1967.

Fetal livers from pregnant rats (7) and control rats (5) were evaluated for the possible effects of ethionine (dissolved in 0.9% NaCl and inj. i.p.) on the developing fine structure of liver cells and for possible premature and/or abnormal ductal proliferation. DL-ethionine was admin. in dosages of 7.5, 15 and 25 mg/100 g body wt. at 12 or 14 days after mating. Fetal livers were removed and examined at 16, 17, 18 and 20 days by both light and electron microscopy. Normal sequences of developmental changes were observed in the fine structure of hepatocytes in control rats. In the livers of fetuses of rats fed ethionine, the mitochondria granules showed enlargement for all dosages. The lowest dosage (7.5 mg) showed the smallest increase in granule size. With respect to the endoplasmic reticulum, the lowest dosage resulted in no disruption, whereas moderate disruption was noted for both the 15 mg and 25 mg dosages (dose initiated on the fourteenth day). Pronounced disruption of the endoplasmic reticulum was observed for the 25 mg dosage initiated on the twelth day. Lipid deposition was increased for all dosages, being greatly increased for the 25 mg dose started on the twelth day. There was a slight increase in lipid deposition for the 7.5 mg dose. There was no effect on glycogen deposition by the 7.5 and 15 mg doses. Delay in glucogen deposition for both groups of rats fed 25 mg doses [twelfth and fourteenth day initiation times]. No evidence of ductal proliferation was observed.

11857 HEPATIC BLOOD FLOW DURING DIFFERENT DEPTHS OF HALOTHANE ANAESTHESIA IN THE DOG. (E.) Ahlgren, I. (Allmanna Hosp., Malmo, Sweden), K.-F. Aronsen, B. Ericsson and A. Fajgelj. Acta Anaesth. Scand. 11(2):91-96, 1967.

The hepatic blood flow during different depths of halothane anesthesia in the dog was estimated with a new method, based on the disappearance rate of ^{133}Xe (60-80 μc dissolved in saline) inj. into the portal vein; the method makes possible frequent measurement of changes in hepatic blood flow and also allows continual recording of the pressure in the portal vein. Admin. of halothane sufficient to give deep anesthesia was associated with a pronounced fall in hepatic blood flow. With adequate alveolar ventilation, with small changes in arterial CO_2 tension, and no hypoxia, the decrease in hepatic blood flow was parallel to the decrease in cardiac output. If the CO_2 tension in the arterial blood was allowed to rise during deep halothane anesthesia, this was associated with an even more pronounced decrease of hepatic blood flow. It was also noted in these dogs that if the depth of anesthesia was kept constant, an i.v. inj. of 0.25 mg atropine was associated with a pronounced fall in hepatic blood flow.

11858 CHANGES OF LIVER PARENCHYMAL CELLS FOLLOWING PARTIAL HEPATECTOMY WITH SIMULTANEOUS ADMINISTRATION OF ACTINOMYCIN. (Ger.) David, H. (Humboldt U., Berlin) and I. Uerlings. Acta Biol. Med. German. 18(2): 275-290, 1967.

A partial hepatectomy (55-65%) was performed on 22 white rats. Some of the rats received 0.1-1.0 μg/g body wt. of actinomycin C or D, i.p. or intrasplenic at operation or shortly thereafter. The liver was excised 4-31 hr. after surgery and tissue was prepared for electron microscopy (2000-30,000 magnification). Within 24 hr. the resected livers had regained their normal wt. and no gross differences were noted between actinomycin-treated and untreated livers. Untreated livers in the first hr. after operation showed: enlarged nuclei; flocculant karyoplasm; some clumped nucleoli, later hypertrophied and some located adjacent to the nuclear membrane; dilated and partly vacuolated endoplasmic reticulum; ribosome formation, first laid down as polysomes; mitochondria of normal size and structure at 10 hr.; osmiophilic lipid particles in vesicles under the cell membrane; hyperplastic Golgi field and dilated Golgi vesicles containing osmiophilic granules. All these early effects became normal at 24 hr. except for the mitochondria, which, normal at 10 hr., became swollen and rounded with a flocculant matrix. Livers treated with actinomycin showed much more pronounced effects: karyoplasm clotte and detached from the nuclear membrane; clotting or dissociation of nucleoli; formation of vesicles in the endoplasmic reticulum; polysomes partly detached from the membranes; mitochondria swollen, the matrix detached, and the cristae fractured; Golgi fields very hyperplastic with numerous osmiophilic fat particles in vesicles; numerous fat globules in the cells; the striking presence of large numbers of lysosomes close to the Golgi field and to the biliary capillaries. The increased need of RNA and protein syntheses during regeneration was upset by the actinomyci induced disorders of the metabolism of these substances. A single dose of actinomycin does not seem to cause irreversible damage to liver cells.

11859 ALPHA-TOCOPHEROL, CEROID, AND CIRRHOSIS. (E.) Patek, A. J. (Columbia U., New York, N. Y.), F. E. Kendall, N. M. deFritsch and R. L. Hirsch. Arch. Path. (Chicago) 84(3):295-299, 1967.

Ceroid formation which was abundant in the livers of young Wistar rats fed cirrhosis-produ ing diets containing 4% casein, 10% corn oil and 81.5% starch was neither retarded nor prevented by supplements with DL-α-tocopherol (0.5-2 mg/10 g of diet which amounted to 0.9-2.4 mg/day). The food intake and growth rate of animals were suboptimal on this 4% casein diet; the addition of α-tocopherol made no apparent difference in growth rate. All animals showed fatty changes in the livers at 2 mo.; fibrosis and cirrhosis were evident at autopsy at 5 mo. However, there was no apparen correlation between ceroid formation and the amount of fat or fibrosis in the liver. There was a sharp rise in triglycerides and cholester while phospholipid values were roughly half tha of the control rats. The fact that supplements of tocopherol failed to alter ceroid formation was attributed to the high conc. of polyunsaturated fat in the diet (linoleic acid). It appears that ceroid formation plays a secondary role, if any, in the pathogenesis of this type of experimental cirrhosis.

11860 ALCOHOL LIVER DAMAGE, WITH SPECIAL ATTENTION TO ZIEVE'S SYNDROME. PART 2. (Ger.) Baumberger, N. (Letzistrasse 21, Zurich). Praxis 56(35):1187-1195, 1967.

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Szydłowski and Z. Zagrobelny. Endokr. Pol.
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OF THE LIVER IN RESPONSE TO HALOTHANE
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PROTECTING COMPOUNDS ON THE METABOLISM
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and, E. (Roy. Cancer Hosp., London) and
ims. Biochem. J. 104(2):394-403, 1967.

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BENZANTHRACENE AND 3,4-BENZPYRENE
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roulinkov, I. (Exp. Med. Lab., Villejuif,
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7 INDUCTION OF HEPATOMAS BY NATURAL
RADIOACTIVITY IN MICE. EARLY RESULTS
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PROTOPORPHYRIN UPON THE INCORPORATION
^{4}C-PROTOPORPHYRIN INTO BILIRUBIN-DAMAGED
R SLICES. (Jap.) Yamamoto, S. (Ohkura Nat.
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. Biol. (Tokyo)) 74(6):306-309, 1967.

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PROTOPORPHYRIN UPON BILIRUBIN. (Jap.)
moto, S. (Ohkura Nat. Hosp., Tokyo), T.
moto, S. Miyasaki, A. Matsuzawa and N. Iijima.
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):310-313, 1967.

11870 THE OCCURRENCE OF THE HEMANGIOMA-LIKE LESION IN THE MOUSE LIVER BY PROLONGED ADMINISTRATION OF BILE. (Jap.) Fukuda, F. (Tokushima U. Sch. Med., Japan). Shikoku Igaku Zasshi (Shikoku Acta Med.) 23(1):15-22, 1967.

11871 CHRONIC ETHANOL INGESTION AND THE HEPATOCARCINOGENICITY OF N-HYDROXY-N-2-FLUORENYLACETAMIDE. (E.) Yamamoto, R. S. (NCI, Bethesda, Md.), J. Korzis and J. H. Weisburger. Int. J. Cancer 2(4):337-343, 1967.

11872 PATTERNS OF TRANSFER RNA IN NORMAL RAT LIVER AND DURING HEPATIC CARCINOGENESIS. (E.) Axel, R. (Columbia Univ. Coll. Physicians, New York, N. Y.), I. B. Weinstein and E. Farber. Proc. Nat. Acad. Sci. USA 58(3):1255-1260, 1967.

11873 LIVER ULTRASTRUCTURE AND FUNCTION IN ICTERIC AND NON-ICTERIC WOMEN USING ORAL CONTRACEPTIVE AGENTS. (E.) Larsson-Cohn, U. (U. Uppsala, Sweden) and U. Stenram. Acta Med. Scand. 181(3):257-264, 1967.

11874 ACTIVITY OF FOLATE REDUCTASE IN RAT LIVER DURING HEPATOCARCINOGENESIS WITH DIETHYLNITROSAMINE. (Ger.) Grünthal, D. (U. Hamburg-Eppendorf, Germany), H. Maass and R. Wagner. Z. Naturforsch. [B] 22(8):855-857, 1967.

11875 CYTOCHEMICAL STUDIES ON THE LIVER AND KIDNEY IN RATS AFTER CHRONIC INTOXICATION WITH ETHYL ALCOHOL AND SIMULTANEOUS MEDICATION WITH "ESSENTIAL" PHOSPHOLIPIDS. (Ger.) Samochowiec, L. (Pharm. Inst., Szczecin, Poland), Z. Steplewski and J. Wójcicki. Acta Biol. Med. German. 18(5):625-632, 1967.

11876 TOXIC LIVER DAMAGE BY ETHIONAMIDE. (Ger.) Kuntz, E. (U. Giessen, Germany), H. Liehr and W. Pfingst. Deutsch. Med. Wschr. 92(38):1718-1722, 1967.

11877 ALCOHOL LIVER DAMAGE WITH SPECIAL CONSIDERATION OF ZIEVE'S SYNDROME. (Ger.) Baumberger, N. (U. Polyclin., Zurich). Praxis 56(34):1146-1153, 1967.

11878 EFFECT OF ETHANOL ON THE GROWTH AND ON THE LIVER AND BRAIN MITOCHONDRIAL FUNCTIONS OF THE OFFSPRINGS OF RATS. (E.) Pilström, L. (St. Goran's Hosp., Stockholm) and K. H. Kiessling. Acta Pharmacol. (Kobenhavn) 25(2):225-232, 1967.

11879 RESULTS OF CORTICOSTEROID TREATMENT OF VIRAL HEPATITIS. (Pol.) Wysocki, J. (1st Infect. Dis. Clin., Warsaw). Pol. Tyg. Lek. 22(27):1035-1038, 1967.

In 651 patients and 151 follow-up cases who were divided into 2 groups (276 treated, 335 controls), the clinical and biochemical results were analyzed. Patients with tuberculosis, diabetes, blood disorders and pregnant women were excluded from this study. Each group was subdivided according to disease severity (6 mg% serum bilirubin - mild, 6-12 mg% medium-severe, over 12 mg% - severe) and age (4-18, 19-60 and over 60 yr.). Treatment most often consisted of an initial dose of 30 mg%/day of cortisone which was gradually reduced every 3 days; in a few cases dexamethasone was used. In the treated group jaundice persisted for a longer period of time (in the under 18 and over 60 yr. age group and in mild cases of the 19-60 yr. age group). Corticosteroid therapy often prolonged the time of hospitalization; however, it increased the appetite and the feeling of well-being and caused a rapid disappearance of dyspeptic and pseudorheumatic symptoms. In the dosage used it caused no severe side effects. Treatment with corticosteroids also seemed to prevent transition of acute viral hepatitis into the chronic form. Follow-up studies 2, 3, 4-7 yr. after illness showed fewer cases of liver enlargement and fewer abnormal liver function tests (especially choline esterase) among those patients treated with steroids during the acute phase of illness. It is concluded that the use of corticosteroids is indicated in viral hepatitis with persisting dyspeptic and pseudorheumatic symptoms, high, long-lasting hyperbilirubinemia, precomatose and comatose states and cases with persistently high levels of serum enzymes.

11880 THE EFFECT OF CORTICOSTEROIDS ON SERUM ALKALINE PHOSPHATASE LEVEL IN PATIENTS WITH VIRUS HEPATITIS. (Pol.) Wysocki, J. (1st Infect. Dis. Clin., Warsaw). Wiad. Lek. 20(5): 475-478, 1967.

Of 343 patients with viral hepatitis 167 were treated with corticosteroids and 176 were control patients. Each of these groups was subdivided according to age (4-18, 19-60, and above 60 yr. old) and severity of disease (light-to 6 mg% of serum bilirubin, medium 6-12 mg% and severe above 12 mg%). Patients received 30 mg cortisone (Erikorton) daily. This dose was then reduced every 3 days. There was no statistically significant difference in the mean values of the alkaline phosphatase levels between the corticosteroid-treated and non-treated patients. In those 19-60 yr. old, a slightly higher enzyme activity was observed in the corticosteroid-treated patients of the mild or medium-severe disease groups. A decrease of bilirubin was often, although not always, accompanied by a decrease of serum alkaline phosphatase activity in patients with viral hepatitis. It is suggested that a decreased activity of this enzyme in the serum of patient with viral hepatitis during a still high serum bilirubin level could be used in prognosis as a sign of an imminent decrease of the bilirubin level and the regression of jaundice.

11881 HEPATITIS AND PREGNANCY. (Ger.) Kallai, L. (U. Zagreb, Yugoslavia), J. Gaon and F. Pinjo. Wien. Z. Inn. Med. 48(5) 186-195, 1967.

Among 3628 pregnant women, 45 cases (1.24%) of hepatitis were found in a 5-yr. period, an incidence similar to that in the general populati These cases were all mild or moderate without fatality. A somewhat greater incidence in the later mo. of pregnancy might have been due to virus inoculation. A circumscribed region (Bos with 200,000 inhabitants was the site of a hepa titis epidemic in 1963; reaching its peak in 19 (241 cases/10,000 population), the epidemic beg a gradual decrease. In 1964 more than 5000 cas of hepatitis were discovered; by August, 1965 1500 more cases were found. All these patients had frank jaundice; if those with anicteric hep titis had been included, the frequency would have been much greater. The frequency of hepatitis during the epidemic was about the same for both sexes; however, almost 10 times as man women died as men (110 women, 13 men). Of the 123 dying during the epidemic, 111 were 16-40 y old and 66 were 20-30 yr. old. The Serbian and Croatian ethnic groups had about the same incidence of hepatitis; the Mohammedans, however, had a greatly elevated incidence amounting to 418 cases/10,000 population; mortality was especially high (119 of the 123 total deaths due to hepatitis). In the course of the epidemic the mortality among pregnant women was 6.2% as compared to the general mortality of women (2.4 Of 19 pregnant women with hepatitis during the epidemic, 4 (21%) died of the disease. Analysi of 218 hepatitis cases during pregnancy showed that 149 recovered and 69 died; mortality was 31.8% and occurred chiefly during the last hal of pregnancy. It is suggested that a high-pro diet, with fewer carbohydrates, especially dur the latter half of pregnancy, might reduce mor

11882 BLOOD COPPER CONTENT OF PREGNANT WOMEN SUFFERING FROM EPIDEMIC HEPATI (Rus.) Shamsutdinova, D. F. (Samarkand Pavlov Med. Inst., USSR). Akush. Ginek. (Moskva) 43(43-47, 1967.

Study of 26 pregnant (26-40 wk.) women with vi hepatitis (mild form, 6; moderately-severe, 15 severe, 5; prodromal periods of different variants) showed that Cu content in the blood (fr the ulnar vein) was higher than in the blood o 25 healthy pregnant women. Cu level was direc proportional to the severity of the disease co Blood Cu content increases mainly due to its

rease in the serum. In patients with mild
m Cu content (in µg%) at increase of symptoms,
the peak of disease and at disappearance of
ptoms was, resp.: in whole blood 185, 152.2 and
.6; in serum 137.6, 115.0 and 103.8; in regular
ments 43.8, 36.8 and 41.0; distribution co-
icient (between regular elements and serum)
1, 0.31 and 0.39. In the patients with moder-
ly severe form it was, resp.: in whole blood
.2, 195.5 and 177.0; in serum 171.5, 151.7 and
.0; in regular elements 52.9, 43.6 and 52.3;
tribution coefficient 0.31, 0.28 and 0.39. In
ents with the severe form it was, resp., in
le blood 234.0, 206.0 and 220.2; in serum 196.0,
0 and 180.5; in regular elements 39.5, 34.0
39.5; distribution coefficient 0.22, 0.19 and
. In healthy pregnant women it was in whole
od 174.0, in serum 115.0, in regular elements
, while the distribution coefficient was 0.47.
ontent in the blood of pregnant patients was
higher than in those who were not pregnant
the distribution coefficient was also more
nsively disturbed. In pregnant patients as
nancy proceeds, Cu content in whole blood,
m and regular elements all increase, while
distribution coefficient decreases. The
severe the course of the disease the more
ounced the decrease in distribution coeffi-
t and the slower its increase. This could
e as an additional test for determining
rity of the disease and its prognosis.

3 ANALYSIS OF SEQUELAE OF VIRAL HEPATITIS
IN PREGNANCY ON THE BASIS OF FOLLOW-UP
INATIONS. (Pol.) Małłek, D. (Strusia
cipal Hosp., Poznan, Poland). Przegl. Epidem.
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een January, 1956 and July, 1964, 149 cases
iral hepatitis among pregnant women were ob-
ed. In only 25% of the cases the course was
um-severe requiring more than 3 wk. of hos-
lization with a bilirubin value of over 10 mg%.
ical and biochemical (blood bilirubin, thymol
, serum protein levels and fractions) follow-
tudies were performed on 62 women divided into
oups: Group 1 (22 cases) was examined several
s 6 mo.-3 yr. after onset of the disease,
2 (40 women) was examined once 3-8 yr. after
disease. Among women of Group 1 75% had
-hepatitis syndrome 3 mo. after the disease
subjective complaints of liver pain in spite
decrease in liver enlargement. There was
a decrease of bilirubin level and thymol
es in spite of continuing pregnancy. The
istence of pregnancy and viral hepatitis
ed to affect serum protein fractions and pro-
levels. There was a decrease of protein
ls and significant hypoalbuminemia which only
ly returned to normal after delivery. Albumin
es still differed from the norm 1 yr. after
very. In Group 2, 37% had no sequelae to
hepatitis in pregnancy, 37.5% complained of
uent pain in the vicinity of the liver and
ed slight deviation of biochemical values,
cially slight dysproteinemia. There was 1
case of severe dysproteinemia and positive thymol test, 3 patients (7.5%) had slightly enlarged livers. Chronic inflammation of other organs was present in 10 women (25% of cases). Two case histories of recurrent, prolonged viral hepatitis were presented but cirrhosis or progressive chronic hepatitis was not noticed in this series of follow-up studies.

11884 EVALUATION OF THE EFFECTIVENESS OF PRESEASONAL ADMINISTRATION OF GAMMA GLOBULIN IN VIRAL HEPATITIS. (Pol.) Kulesza, A. (Inst. Epidem., Warsaw), M. Kacprzak, A. Koźmińska, M. Krajewska, T. Rodkiewicz, L. Twardowska, K. Wagner and H. Waluszkiewicz. Przegl. Epidem. 21(2):215-220, 1967.

Children between the ages of 7-14 yr. were divided into 2 groups: In Group 1, 10,880 children received 0.03 ml/kg of γ-globulin preseasonally at the beginning of September, 1965; Group 2 served as control and consisted of 11,033 pupils who received γ-globulin only when their exposure to viral hepatitis patients was established. The internal structure of both groups as to sex, age, previous incidence of viral hepatitis, family size (number of siblings) was statistically analyzed and proven to be comparable with each other and the general population. Between September, 1965 and August 31, 1966 there were 7 cases of viral hepatitis among the 10,880 children who received γ-globulin preseasonally (64.3 incidence/100,000). These 1-yr. results showed that the percentage of protected children in the experimental group was 90.5% and the index of effectiveness of preseasonal γ-globulin admin. was 1:10.6. While the incidence of viral hepatitis among the control group showed the usual seasonal peak from October through December there was only a sporadic incidence during the entire yr. among the γ-globulin-treated children. It is concluded that preseasonal γ-globulin is more effective against viral hepatitis than it is in just those who are known to have been exposed to the disease.

11885 THE ACTION OF GLUCURONOLACTONE ON THE COMPARATIVE EXCRETION OF 17-KETOSTEROIDS AND GLUCURONIC ACID IN INFECTIOUS HEPATITIS. (Ger.) Buşilă, V. T. (Med. Inst., Timisoara, Rumania), M. Dragomirescu, L. Dragomirescu, A. Rădulescu and A. Zimmer. Z. Ges. Inn. Med. 22(14):426-429, 1967.

These tests were made on 8 normal subjects and 23 hepatitis patients with diagnoses by clinical and laboratory findings. The spontaneous excretion of 17-ketosteroids, the 17-hydroxycorticosteroids as well as glucuronic acid were determined in the 24-hr. urine collection; the next day 0.5 g of glucuronolactone was admin. and the following day, the 3 substances were again determined in the 24-hr. urine collection. The 8 normal subjects, because of the integrity of the liver cells, had a high degree (90%) of utilization of the glucuronolactone and a diminished excretion of glucuronic acid with decreased excretion of 17-ketosteroids (12.60 mg/day before and 9.36 mg/day after admin. of glucuronolactone) and not much change in 17-hydroxycorticosteroid excretion (7.59 mg/day before and 7.80 mg/day after). The av. excretion of those with hepatitis (utilization of the lactone from 81% down to 15%, av. 53%, depending on the severity of the disease) was 17-ketosteroids (9.52 mg/day before and 11.75 mg/day after) and 17-hydroxycorticosteroids (6.74 mg/day before and 9.33 mg/day after).

11886 PROGNOSIS OF VIRAL HEPATITIS. (Ger.) Seifert, E. (Hanusch Hosp., Vienna), H. Dittrich and I. Hölbel. Gastroenterologia (Basel) 107(5):294-304, 1967.

Liver biopsies were taken from 194 patients during the acute phase of viral hepatitis; in 63 there were indications of severe hepatitis, especially in respect to the mesenchymal reaction and in 131 cases the histology showed a light-to-moderate type. These 2 groups were compared after half, 1, 2, and 3 yr. and those with the more severe histological courses showed a longer clinical recovery than those with less liver damage; these differences were statistically significant. Of the group with severe histological indications 7.9% died as compared to 0.8% of the other group. Incidence of cirrhosis in the former group was 14.3% and in the latter 4.6%, chronic hepatitis occurred in 6.3% and 0.8%, resp.; bilirubinemia was the same in both groups: 3.1-3.2%. Therapeutic measures including prednisolone were disappointing; thus, after 3 yr., clinical normality was only 86.2% in 160 cases receiving prednisolone and 95.2% in 172 cases without it in a total number of 332 patients undergoing periodic serum enzyme, bilirubin, liver function tests, and biopsies.

11887 MORPHOGENESIS OF EOSINOPHILIC NECROSIS IN SINGLE PARENCHYMAL CELLS OF THE HUMAN LIVER. CORRELATION OF LIGHT AND ELECTRON MICROSCOPE STUDIES. (Ger.) Moppert, J. (U. Freiburg i. Br., Germany), D. v. Ekesparre and L. Bianchi. Virchow Arch. Path. Anat. 342(3):210-220, 1967.

Liver biopsies of patients with viral hepatitis were studied by light and electron microscopy for the acidophilic necrotic alterations in single cells representing various developmental stages of cytoplasmic coagulation necrosis. The first effect observed under light microscopy was the eosinophilic degeneration of liver epithelial cells; the cytoplasm appeared to be condensed and strongly eosinophilic, the nucleus homogenized and dark; cell boundaries were mostly concave. Ultramicroscopy also showed a condensation of the cytoplasm with close-packing of organelles. Wavy inner and outer membranes surrounded the nucleus, the contents homogenized with no visible chromatin structure. The intensity of the nuclear changes lagged behind those in the cytoplasm. However, the organelles of the cytoplasm were often unchanged. The parenchymal cells had swollen mitochondria with clarification and flocculation of the matrix; vesiculation of the ergastoplasm was noted. Subsequently the necrotic changes took 1 of 2 general courses: 1) The ultrastructure remained fairly constant often with a finely-vacuolated cytoplasm. Cristae and grana of the mitochondria were often lacking. Other minor change in the cytoplasm were observed. The nucleus was pyknotic. 2) The ultrastructure underwent far-reaching changes: In the optical microscope the cells showed acidophil, red or hyaline bodies (Councilman-like bodies) mostly round, sharply-defined, strongly eosinophil, bearing punctate o ribbon-like dark structures. These cells seldom presented a pyknotic nucleus. The cells having taken either course broke up quickly and the fragments, ingested by histiocytes, were digeste or were transformed into eosinophil bodies which disintegrated.

11888 STUDIES ON THE ETIOLOGY OF VIRAL HEPATITIS. III. NEW METHODS FOR ISOLATING VIRUSES FROM THE BLOOD OF PATIENTS WIT VIRAL HEPATITIS. (E.) Georgiades, J. (Dept. Me Microbiol., Cracow, Poland), I. Zgórniak-Nowosie ska, M. Zembala, W. Kilarski and S. Obal. Acta Med. Pol. 8(2):137-156, 1967.

After infecting human thyroid cells with sera obtained 2-16 days after the appearance of jaun from patients (ages 5-75 yr.) with viral hepati plaques appeared in about 12-16 days with diame not exceeding 2 mm. Trials to isolate the cytopathogenic agents by this plaque technic were m with 64 materials from 40 patients by inoculati each material in native form and simultaneously after neomycin and trypsin treatment (for dissoc tion of the virus-inhibitor complex). The smal number of culture results was obtained from nat sera (approx. 20% as compared to approx. 80%), while the difference in the isolation rate from material treated with neomycin or trypsin was slight. Isolation from blood clot homogenates gave somewhat better results than from sera. U sera and performing the test over a 3-mo. perio a high rate of reproducibility of isolations wa obtained. Thirteen of 14 of these isolated vir strains which had previously been passed 3-4 ti in test tube cultures of human embryonic cells were found to be sensitive to 5-iododeoxyuridin and resistant to ether, indicating that these isolated agents belong to the DNA-group of viru Electron-microscopic study of cells infected wi the isolated factors revealed profound changes cellular structure and groups of osmophilic bod 25-50 millimicrons in diameter, sometimes formi large conglomerates.

11889 STUDIES ON THE ETIOLOGY OF VIRAL HEPATITIS. IV. ATTEMPTS OF ISOLATIN VIRUSES ON HUMAN EMBRYONIC FIBROBLAST TISSUE.

giades, J. (Dept. Med. Microbiol., Cracow,
nd), M. Zembala, I. Zgorniak-Nowosielska and
bal. Acta Med. Pol. 8(2):157-162, 1967.

technic previously described allowed the iso-
on of viruses from the sera of patients with
l hepatitis on embryonic fibroblasts. The
ation rate from heated sera was significantly
er than from unheated sera; only inhibitor
ls from myxoviruses were decreased after 6 hr.
ing at 37°. Inhibitor titers for the polyoma
s were not lowered. Sera stored in the freezer
a lower isolation rate. Storage of the sera
°C for several days also decreased the number
solations. Inhibitor levels were not decreased
era kept in the refrigerator before heating.
ty-four strains were isolated, all but 7 pro-
d cytopathic effects after 2-9 passages were
. None were inhibited by ether. Infectious
rs determined by means of cytopathic effect
10^4-10^5. Electron microscope studies re-
ed bodies about 70 millimicrons in diameter
an electron-dense center. The isolated
ins did not agglutinate chicken, sheep or
ea pig RBC. Lack of serologic response demon-
ble by means of the complement fixation test
ne sera of these patients may be evidence that
solated viruses are not related to the disease,
ng their etiologic role to be explained.

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s, C. Polito, M. Lancia and A. Passerini.
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WITH MHV-3 VIRUS UPON THE CONTENT OF
GEN, PHOSPHORUS, FAT AND DRY SUBSTANCE IN
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11899 PROGNOSTIC STUDIES ON HEPATITIS. (Jap.) Takeda, Y. (Sendai Nat. Hosp., Miyagi, Japan), S. Sato, K. Ogawa and N. Ohara. Iryo 21(4):488-491, 1967.

11900 PROGNOSIS OF ACUTE HEPATITIS. (PRELIMINARY REPORT). (Jap.) Sano, I. (1st Tokyo Nat. Hosp.) Iryo 21(4):492-497, 1967.

11901 USEFULNESS OF THE HOYT-MORRISON REACTION IN VIRAL HEPATITIS (PRELIMINARY NOTE). (It.) Aiuti, F. (U. Rome), G. B. Serra, G. Turbessi, S. Ungari and M. Orzalesi. G. Mal. Infett. 19(5):332-333, 1967.

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11903 TRANSMISSION OF SERUM HEPATITIS IN IMMUNIZED (ANTI-D) DONORS. (Fr.) Soulier, J. P. (Nat. Ctr. Blood Trans., Paris), J. Andre-Liardet, A. M. Pauty and S. Lewi. Transfusion (Paris) 10(1):79-95, 1967.

11904 INCIDENCE OF SERUM HEPATITIS IN SAPPORO. (Jap.) Furuya, K. (Sapporo Nat. Hosp., Japan), C. Mikuni, T. Ujiie, M. Ōshima, A. Shimoda and I. Takagaki. Iryo 21(4):418-425, 1967.

11905 OCCURRENCE OF POST-TRANSFUSION HEPATITIS BY USING DONOR BLOOD IN THORACIC SURGERY. (Jap.) Tsujikawa, H. (Kakogawa Nat. Sanatorium, Japan), S. Yokoyama, Y. Iizuka, S. Okoshi and S. Nakamura. Iryo 21(4):505-509, 1967.

11906 A STUDY OF SERUM HEPATITIS AFTER OPERATION FOR PULMONARY TUBERCULOSIS. (Jap.) Ishiyama, K. (Murayama Nat. Sanatorium, Tokyo) and K. Ishii. Iryo 21(4):426-433, 1967.

11907 THE USE OF GAMMA GLOBULIN IN THE PROPHYLAXIS OF POST-TRANSFUSION HEPATITIS. (Jap.) Shimada, T. (Muramatsuseiranso Nat. Sanatorium, Ibaragi, Japan), Y. Soma, K. Kikuchi, S. Hamano, K. Okamoto and Y. Kano. Iryo 21(4): 434-439, 1967.

11908 STATISTICAL STUDIES ON SERUM HEPATITIS. (Jap.) Sairenji, M. (Mito Nat. Hosp., Ibaragi, Japan), A. Watanabe, A. Murakami, S. Shibazaki and I. Watanabe. Iryo 21(4):440-446, 1967.

11909 STATISTICAL STUDY ON SERUM HEPATITIS. (Jap.) Fujita, K. (Myojo Nat. Sanatorium, Mie, Japan), M. Nenohi, S. Yamakawa and Y. Kawarada. Iryo 21(4):447-450, 1967.

11910 THE CONNECTION BETWEEN DONOR BLOOD TRANSFUSION AND POST-TRANSFUSION HEPATITIS. (Jap.) Ueda, N. (Asahigawa Nat. Sanatorium, Hokkaido, Japan), A. Shibuya, I. Onodera, T. Nakagawa and Y. Katsuki. Iryo 21(4): 451-454, 1967.

11911 STUDIES ON HEPATIC DAMAGE AFTER BLOOD TRANSFUSION. (Jap.) Iwamoto, Y. (Fukuokahigashi-Byoin Nat. Sanatorium, Fukuoka, Japan) and K. Sakato. Iryo 21(4):455-458, 1967.

11912 VIRAL HEPATITIS AND ORGANIC FACTORS IN COMBATTING THE VIRUS. (Sp.)(Rev.) Arias Vallejo, E. (Hermanos Aznar Clin., Madrid). Rev. Esp. Enferm. Apar. Dig. 26(6):777-794, 1967.

11913 BLOOD-RENAL INDICES IN PATIENTS WITH INFECTIOUS HEPATITIS TREATED WITH PREDNISOLONE. (Rus.) Lapushinskii, D. P. (Vitebsk Med. Inst., USSR). Ter. Arkh. 39(8): 23-27, 1967.

11914 COMPARISON OF DISTANT RESULTS OF TREATMENT OF INFECTIOUS HEPATITIS WITH OR WITHOUT PREDNISOLONE. (Rus.) Geller, L. I. (Khabarovo Med. Inst., USSR), Z. P. Kozlova and T.P. Glinskaia. Ter. Arkh. 39(8):28-32, 1967.

11915 BLOOD AND BLOOD SUBSTITUTES IN THE COMPLEX TREATMENT OF INFECTIOUS HEPATITIS. (Rus.) Ivanov, F. K. (Odessa Med. Inst., USSR). Vrach. Delo (9):105-107, 1967.

11916 FUNCTIONAL STATE OF THE ADRENAL CORTEX AND CORTICOSTEROID TREATMENT IN INFECTIOUS HEPATITIS. (Rus.) Bychkova, V. I. (Dnepropetrovsk Med. Inst., USSR). Vrach. Delo (8):93-97, 1967.

11917 INFECTIOUS HEPATITIS AS AN OCCUPATIONA DISEASE. (Ger.) Berg, V. Med. Klin. 62(37):1422-1425, 1967.

11918 MORBIDITY OF VIRAL HEPATITIS IN THE NAVY. (It.) Rossi, M. (U. Genoa, Italy) and G. B. Itri. G. Igiene Med. Prevent. 8(2):257-267, 1967.

11919 AN EPIDEMIOLOGIC STUDY ON VIRAL HEPATITIS IN AN INSTITUTION FOR THE MENTALLY RETARDED. (E.) Sinha, S. K. (Cent. Wisconsin Colony, Madison), J. B. Toussaint and J. Preizler. Amer. J. Ment. Defic. 72(1):114-1 1967.

11920 A MYXOVIRUS ISOLATED FROM A CASE OF INFECTIOUS HEPATITIS. (E.) Spano, C (U. Palermo, Italy) and L. Dardanoni. Riv. Ist Sieroter. Ital. 42(4):169-180, 1967.

11921 TRANSMISSION OF VIRAL HEPATITIS AND POSSIBILITIES OF ITS PREVENTION. (E. Morelj, M. Rev. Int. Serv. Sante Armees 40(6): 521-528, 1967.

11922 IMMUNOGLOBULIN CHANGES IN VIRAL HEPA-TITIS. (It.) Monteverde, A. (Charit Hosp., Novara, Italy), P. T. Ricciardiello and P. Aina. Rass. Fisiopat. Clin. Ter. 39(2):180-193, 1967.

11923 A STUDY OF COMPLEMENT-FIXING ANTIBODI TO ADENOVIRUSES IN PATIENTS WITH INFECTIOUS HEPATITIS. (Rus.) Svezhentseva, N. (Mechnikov Odessa Sci. Res. Inst., USSR). Vrac Delo (9):107-109, 1967.

11924 SERUM LEVEL OF PROTEIN-BOUND IODINE IN HEPATITIS. (Pol.) Bublewska, B. (1st Intern. Dis. Clin., Danzig, Poland). Act Biol. Med. (Gdansk) 10:71-94, 1966.

25 EVIDENCE FOR THE PRESENCE IN HUMAN
PLASMA OF AN ESTROGEN-BINDING FACTOR
ER THAN ALBUMIN: ABNORMAL BINDING OF ESTRADIOL
MEN WITH HEPATIC CIRRHOSIS. (E.) Tavernetti,
T. (Columbia U. Coll. Physicians & Surg.,
York City), W. Rosenbaum, W. G. Kelly, N. P.
isty and M. S. Roginsky. J. Clin. Endocr.
7):920-926, 1967.

binding of estradiol in diluted plasma of
mal men (29), normal women (13) and 26 male
ients with liver cirrhosis was determined
er conditions of equilibrium dialysis at 4°C.
18 of 26 cirrhotics, diagnosis was confirmed
liver biopsy; 2 of these 18 had schistosomal
rhosis, and the remainder had Laennec's
rhosis. Under these conditions, the percentage
free estradiol in the plasma of the normal
(29.0%) was greater than that in the plasma
both the normal women (17.6%) and the
rhotic subjects (20.8%). The normal subjects
normal conc. of albumin in their plasma,
reas the cirrhotic subjects had a lower conc.
observed differences in the binding of
radiol could not be correlated with these
ferences in albumin conc.; therefore the
stence of an additional estrogen-binding fac-
in plasma was postulated. No evident cor-
ation between the binding of estradiol and
degree of feminization of cirrhotics was
nd, and there was no evidence of a correlation
ween the fraction of free estradiol in the
sma of women and the stage of their menstrual
les.

26 PARADOXICAL EFFECTS OF PREDNISONE ON
GLUCOSE METABOLISM IN CIRRHOSIS OF THE
ER. (E.) Radó, J. P. (Janos Hosp., Budapest),
Somogyi, T. Takó and G. Bikich. Z. Vitamin
non Fermentforsch. 14(4):343-355, 1967.

20 patients with liver cirrhosis, 8 had
anced, decompensated cirrhosis with severe
ites and 12 had compensated cirrhosis. The
ients were fed a carbohydrate-rich preparatory
for several days before the study. A total
40 mg of prednisone was admin. daily for 5-7
, and this short-term treatment was followed
an acute prednisone-loading (30 mg at 6 a.m.,
ng at 7 a.m., followed by ingestion of glucose).
id i.v. and standard glucose tolerance tests
e made repeatedly and during the standard
, arteriovenous glucose difference was deter-
ed. The relative assimilation index was
culated according to Somogyi, and was regarded
an index of peripheral glucose utilization.
adoxical changes in glucose metabolism were
erved after admin. of prednisone. The
appearance rate of glucose increased in most
the patients in response to short-term treat-
. An increase of intrahepatic utilization
suggested, since in response to the same
atment, peripheral glucose utilization
erally decreased. The relative assimilation index increased in the compensated group during acute loading only, indicating a relative increase in the peripheral glucose utilization. The standard blood sugar curve became flatter during short-term treatment in the decompensated group, and in some cases the peripheral glucose utilization also improved.

11927 PLASMA UNESTERIFIED FATTY ACIDS AND LIPOPROTEIN LIPASE ACTIVITY IN CIRRHOSIS OF THE LIVER. (Pol.) Ignatowska, H. (2nd Intern. Dis. Clin., Warsaw) and T. Wąsowska-Ciszek. Pol. Arch. Med. Wewnet. 38(3): 309-314, 1967.

Plasma unesterified fatty acids, lipoprotein lipase activity (at rest and after heparin admin.) were determined in 34 patients (39-71 yr. old) with cirrhosis and compared to values obtained from 14 healthy subjects (22-35 yr. old). In 9 patients the lipoprotein lipase level in the peripheral vein was compared to that in the hepatic venous blood which was obtained by catheterization of the hepatic vein. The level of unesterified fatty acids varied in patients with cirrhosis between 0.393 mEq/liter and 3.036 mEq/liter. The mean value of 1.190 mEq/liter ± 0.661 was higher than that of the controls (0.526 mEq/liter) and the difference was statistically significant. There was no statistically significant correlation between the unesterified fatty acid level and the albumin level. Neither controls nor patients with cirrhosis showed serum lipoprotein lipase activity without previous heparin admin. Lipase activity after heparin admin. varied after 1 hr. incubation between 5.6 U and 35.4 U. The mean value of 18.2 ± 10 was lower than that found in the control subject but the difference was statistically insignificant. During the second hr. of incubation there was a significantly greater increase of enzyme activity in patients with cirrhosis than in the controls. In the controls the increase of activity varied between 39-76% (av. 57% ± 14) compared to the first hr. of incubation while in the patients it varied 46-176% (av. 110% ± 42). The difference was statistically valid. After heparin admin. no difference of lipoprotein lipase activity could be found between samples of peripheral blood and blood from the hepatic vein in patients with cirrhosis of the liver.

11928 INTESTINAL ABSORPTION IN CIRRHOSIS OF THE LIVER. (Pol.) Bogdał, J. (2nd Intern. Dis. Clin., Cracow), K. Cichecka, H. Drożdż, A. Jędrychowski, S. Kirchmayer and M. Mysik. Pol. Arch. Med. Wewnet. 38(3): 283-291, 1967.

A diet containing 100 g of fat was given to patients with cirrhosis of the liver for 5 days and after the third day fats in the stool were determined. The patients were divided into 2 groups; the first group (11) had portal hypertension and ascites, the second group (6) cirrhosis without ascites. A non-steatorrheic weak-to-moderate diarrhea was present in 4 patients of the first group and 1 of the second. Determination of fats in the stools showed a definite increase of total fats, neutral fats and fatty acids in 5 of the first group. Among patients of the second group there was no increase of fats above normal levels. Analysis of neutral fat, fatty acids and the quantitative ratio of the 2 components with a demonstration of a relationship between lipid absorption and portal congestion indicated that impaired utilization of fat in cirrhosis of the liver is due to both disturbed digestion and abnormal intestinal absorption. Only a minor degree of fat absorption impairment could be noted (mainly after fat loading) and in the majority of cases diarrhea did not result. Diarrhea was more common in patients who showed no malabsorption. The vitamin A level increase after loading was inhibited in 13 of 17 patients tested and the weaker increase of vitamin A level was more pronounced in patients of the first group. Serum carotene levels were decreased in 5 patients, nounced in patients of the first group. Serum carotene levels were decreased in 5 patients, serum vitamin A levels were decreased in 7 patients and did not correlate with the results of fat determination in stools. The D-xylose test showed a reduced urinary excretion of pentose in 9 patients of the first group and 3 of the second group but did not correlate with the results of the fat-loading tests. There was no correlation between the results of the fat-loading test and the BSP test, bilirubin level, transaminase activity, choline esterase level, prothrombin complex and serum albumin.

11929 CULTIVATION OF PERIPHERAL LEUCOCYTES IN THE PRESENCE OF LIVER ANTIGEN IN LIVER CIRRHOSIS.

(E.) Hoenig, V. (Ist Dept. Intern. Med., Prague) and V. Pössnerová. Z. Immunitaetsforsch. 133(2):199-204, 1967.

Peripheral WBC from 7 patients (1 man, 6 women) with liver cirrhosis and from 5 blood donors were cultivated with and without human liver antigen. The WBC were isolated and cultivated according to the technic of Hungerford in Quaglino's modification, using Epl's medium instead of TC 199. The differential count in cultures from cirrhotic patients was very variable, particularly with regard to polynuclear WBC and macrophages. The proportion of transition cells or of blastoid elements did not exceed 2% both with and without liver antigen added. In cultures from 3 patients with cirrhosis rare mitoses were present on the third day of cultivation with liver antigen, in 1 of them repeatedly. Mitoses did not occur in WBC cultures from cirrhotic patients without liver antigen added or in control cultures. Control cultures with phytohemagglutinin revealed a typical stimulation consisting of a striking increase of transformed elements and mitoses. These results indicate that there are no striking quantitative differences between the culture of WBC from cirrhotic and normal subjects. If autoimmunization were implicated, a more pronounced stimulation would have been expected in the presence of liver antigen; the slightly increased stimulation of WBC cultures from some cirrhotic patients by liver antigen requires further study.

11930 ANALYSIS OF THE CONDITIONS FOR THE APPEARANCE OF ANTIBODIES DURING HEPATIC CIRRHOSIS.

(Fr.) Rochant, H. (Cent. Dept. Blood Transfusion, Paris), A. Gerbal, A. Najman, D. Salmon, F. Grémy, C. Salmon and J. Caroli. Nouv. Rev. Franc. Hemat. 7(3):415-425, 1967.

Patients with liver cirrhosis (60 men and 29 women) were examined for immune antibodies. Each received 15 different tests including 5 different anti-RBC, auto-antibody, iso-antibody and hemagglutinin tests; single antiplatelet, anti-WBC and antinucleoprotein tests; antiglobulin and antithyroidoglobulin; anticardiolip and heterophil antibody tests as well as tests for antibodies against specific blood groups. A large group of subjects with normal livers also underwent these tests showing that concomitant with cirrhosis there is a derangement of the antibody-forming system reacting in an exaggerated way to the stimulus of transfusion. Auto-agglutination of RBC, very rare among normal individuals, occurred in 32% of cirrhotics. Antinuclear antibodies were present in 45% of cirrhotics as compared to 8% of those with normal livers. There was an absence of iso-antibodies, immune anti-RBC, anti-WBC and anti-platelets in individuals with liver cirrhosis. The 89 cirrhotics also had elevated rheumatoid factors (18%), nonspecific antiglobulin (12%) and nonspecific heterophil antibodies (40%); the effects were more pronounced among the women. Although many possible factors (such as portal hypertension) were considered in analysis of the test data, no definite explanation of the antibody reactions of cirrhosis was found.

11931 SECRETION OF GASTRIC ACID AFTER ADMINISTRATION OF HISTALOG AND GASTRIN PENTAPEPTIDE IN PERSONS WITH HEALTHY LIVERS AND PATIENTS SUFFERING FROM LIVER CIRRHOSIS.

(Ger.) Adlunge, J. (Ist Med. Clin., Lubeck, Germany), E. Schmid and G. Junker. Z. Gastroent. 5(4): 218-221, 1967.

The stimulation of gastric acid secretion by 50 mg betazole and by 0.25 mg gastrin pentapeptide admin. s.c. was compared in separate tests given to 20 subjects, 10 normal and 10 wi liver cirrhosis. Gastric secretion was collecte in 10-min. fractions for 1 hr. and in 15-min. fractions in the next hr. after removal of resting secretion. Acid was determined in the

ctions by titration. In effect, 0.25 mg of
trin was about equal to 50 mg of betazole,
ching about the same peak acid value in 45-60
. Stimulation of acid secretion by betazole
ved longer persistence, having a value of
ut 40 mEq HCl/liter after 2 hr. as compared
3 mEq/liter for stimulation by gastrin.
nulation of gastric acid secretion in cirrhotic
ients showed higher peak values than normal
longer persistence for both compounds, with
of betazole being greater after 2 hr.
tazole 45 mEq/liter and gastrin 35 mEq/liter).

32 CIRRHOSIS OF THE LIVER, ALCOHOLISM AND HEAVY SMOKING ASSOCIATED WITH CANCER
THE MOUTH AND PHARYNX. (E.) Keller, A. Z.
Cent. Office, Washington, D. C.). Cancer
5):1015-1022, 1967.

ew York City study of cancer of the mouth and
rynx is presented, based on 408 cases and 408
-matched controls; each case was a male with
tologically-confirmed squamous cell carcinoma
the mouth or pharynx. The median age was 60
, and distribution among other age groups was
follows: 30-39 yr., 2.2%; 40-49 yr., 18.1%;
59 yr., 26.7%; 60-69 yr., 41.2%; 70-79 yr.,
, and 80 or more yr., 2.0%. Clinically
gnosed liver cirrhosis was found in 20% of the
es and 9% of the controls, a statistically
nificant difference. An excess of liver
rhosis was significant for cases of cancer of
floor of the mouth, uvula and soft palate,
pharynx and hypopharynx. Among 28 cases of
existing carcinoma, liver cirrhosis was found
4.3% of them and in 7.2% of their age-matched
rols. A total of 42% of the cases were
y drinkers (1.6 or more ounces of liquor/day),
ared to 19% of the controls; excess of heavy
king among cases was significant for cases
carcinoma of the floor of the mouth and meso-
ynx (as with cirrhosis) and tongue. Heavy
ing was found among 26% of the cases, and
of the controls; excess of heavy smoking was
ificant for cases of carcinoma of the floor
he mouth (as with cirrhosis) and tongue. For
airs matched by age and use of alcohol, the
entage with clinically diagnosed cirrhosis of
liver was 22% among the cases and 11% among
controls. Cirrhosis of the liver occurred
early 33% of the patients and controls who
k excessively, but it occurred in only 13%
56 patients and 3% of 190 controls who did
drink heavily. The association of liver
hosis with cancer was even found to exist
patients as cases and controls consumed the
amount of alcohol. The association of
hosis with cancer also existed when patients
ases and controls smoked the same amount of
cco. Heavy smoking was not associated with
hosis of the liver. These findings are
istent with the conclusion that heavy smok-
heavy drinking and liver cirrhosis (either
e or as a measure of heavy drinking) are
ciated with cancer of the mouth and pharynx.

11933 MITOCHONDRIAL ANTIBODIES IN PRIMARY BILIARY CIRRHOSIS. I. LOCALIZATION OF THE ANTIGEN TO MITOCHONDRIAL MEMBRANES. (E.) Berg, P. A. (Middlesex Hosp. Med. Sch., London), D. Doniach and I. M. Roitt. J. Exp. Med. 126(2): 277-290, 1967.

Sera from 34 patients with proven primary biliary cirrhosis were evaluated by quantitative complement fixation and immunofluorescence studies in order to attempt localization of the antigen. Complement fixation antigen was recovered in the crude mitochondrial fraction in the greatest amount (50-75%) with the rest being recovered from the nuclear fraction and the 26,000 times gravity fluffy layer. Mitochondrial samples generally contained 2000-3000 U/ml. All 34 sera samples reacted strongly with mitochondrial fractions when tested by quantitative complement fixation. The mitochondrial location of the antigen was confirmed by the use of marker enzymes. Using succinic dehydrogenase as a mitochondrial marker, a high correlation for complement fixation activity in the mitochondrial fraction was obtained. To exclude lysosomal involvement in the complement fixation reaction, complement fixation and marker enzyme studies were conducted on lysosomal fractions. No appreciable antigenic activity was demonstrated. Staining patterns using the direct conjugate of IgG from 1 patient with primary biliary cirrhosis paralleled those obtained by histochemical assay for succinic dehydrogenase. Staining was most intense in those cells with mitochondria and intact cristae. Separate studies in which the mitochondria were fragmented by hypotonic soln., hexane (solvent), lysolecithin (detergent), and ultrasound further demonstrated that the antigen involved in primary biliary cirrhosis is associated with the mitochondrial inner membranes.

11934 ALBUMIN SYNTHESIS RATE AS A MEASURE OF LIVER FUNCTION IN PATIENTS WITH CIRRHOSIS. (E.) Hasch, E. (Bispebjerg Hosp., Copenhagen), S. Jarnum and N. Tygstrup. Acta Med. Scand. 182(1):83-92, 1967.

A total of 21 patients (7 men, 14 women; 46-78 yr. old, with a mean of 64 yr.) with cirrhosis of the liver (confirmed histologically in 18) and 28 control subjects were studied with ^{131}I-labeled human albumin. Three cirrhotic subjects were studied before and after prednisone treatment (approx. 20 mg/day). Turnover data of the 2 groups were compared, and in the group with cirrhosis, the data were compared with the results of common liver function tests and the clinical severity of the disease. A highly significant difference existed between several parameters of albumin turnover in the 2 groups. Albumin synthesis rate showed the most pronounced reduction in patients with cirrhosis as compared with control subjects (approx. 50%); the serum albumin conc. was only depressed to 61% of the normal mean. Albumin clearance and fractional catabolic rate were only slightly depressed in cirrhotics. Only plasma vol. was higher than normal in cirrhotics. In the 3 patients treated with prednisone, albumin synthesis rates increased in all, as did the clinical condition, and the serum albumin increased in 2. Within the group with cirrhosis, statistical treatment of the data showed that albumin synthesis rate was poorly and insignificantly related to other liver function tests. It is concluded that albumin synthesis rate as determined by radioiodine-labeled albumin is an unreliable measure of the severity of cirrhosis, and like most other liver function tests, it is uncertain as a prognostic guide in the individual patient.

11935 REGRESSION OF DIETARY CIRRHOSIS IN RATS FED ALCOHOL AND A "SUPER DIET." EVIDENCE OF THE NONHEPATOTOXIC NATURE OF ETHANOL.

(E.) Takada, A. (Hosp. Sick Child., Toronto, Canada), E. A. Porta and W. S. Hartroft. Amer. J. Clin. Nutr. 20(3):213-225, 1967.

Male albino Wistar rats were maintained for 7 mo. on a solid semisynthetic food mixture low in protein, choline and vitamin B_{12}. At the start of the eighth mo., the rats were distributed among 3 groups according to the severity of hepatic injury ascertained at laparotomy: Group 1 was used as an untreated negative control by continuing its members on the solid, basal, choline-deficient diet; Group 2 received an alcohol-containing liquid diet; and Group 3 received a nonalcohol liquid diet. Each liquid diet provided 1.0 calories/ml. In the alcoholic diet, 36% of the total calories was provided by alcohol; 15.36% by carbohydrates; 25.60% by fat; and 23.04% by protein. In the nonalcoholic diet (the "super diet"), 24% of total calories derived from sucrose, 40% from fat, and 36% from protein. All 3 groups were fed their respective diets for 3 mo. Mortality rates in Groups 1, 2, and 3 were 33%; 20% and 33%, resp. Rats in Group 1 grew poorly, attaining finally a total increase of only 15% of their initial wt.; rats in Groups 2 and 3 increased almost 40% in their av. body wt. The values of liver wt. in Group 1 were higher than those in Groups 2 and 3, with no significant differences between the last 2 groups. Rapid and remarkable improvement of all measured parameters of liver function was observed in Groups 2 and 3. SGOT and alkaline phosphatase activities were higher, and albumin:globulin ratios and total cholesterol were lower, in Group 1 than in Groups 2 and 3; no significant differences were found among the latter, with the exception of values of serum total cholesterol which, at the end of the experiment, were significantly higher in Group 2 animals. Hepatic DNA content was significantly higher in Group 1 than in Groups 2 and 3, with no differences among the latter. No significant differences in content of hepatic RNA were found in any of the groups. The content of dry defatted tissue (corresponding to the content of crude protein in the liver) were significantly lower in Group 1 than in Groups 2 and 3. Group 1 had a significantly higher content of alkali-soluble collagen than Groups 2 and 3. Hepatic triglycerides in Group 1 were approx. 10-fold higher than in Groups 2 and 3. High levels of total cholesterol were found in livers of Group 1, while in the other 2 groups, particularly 2, these values were significantly lower. The highest levels of hepatic phospholipids were Group 2; however, the differences between these values and those of Group 1 were only slightly significant and did not differ in significance from those of Group 3. At the end of the experiment, livers of rats from Group displayed lesions that conformed to the fatty multilobular type of cirrhosis; in livers from rats of Group 2, visible fat had almost disappeared, nodules were considerably smaller, and trabeculae thinner and relatively acellular; ceroid had become quite prominent; livers of Group 3 rats resembled those of Group 2, except that ceroid was even more prominent. Under the electron microscope, hepatocytes of rats from Group 1 showed the most severe ultrastructural changes; mitochondria in general were enlarged (megamitochondria) and spherulated with diminuti and shortening of their cristae; ribosomes were diminished and usually dispersed; hepatocellular cytoplasm was vacuolated by dilatation of the cisternae of the endoplasmic reticulum. Configuration of hepatocytes in Group 2 was better preserved, with only minor abnormalities demonstrated. The general impression was that mitochondria were better preserved in Group 3 hepatocytes than in those of Group 2. It is concluded that addition of alcohol to the nutritionally adequate "super" diets permitted regression of cirrhosis to the same degree as in comparably cirrhotic animals given the same diets without the added alcohol. This result provides evidence against the hypothesis that alcohol is cirrhogenic by virtue of a direct hepatotoxic action.

11936 LIVER AND SERUM ZINC ABNORMALITIES IN RATS WITH CIRRHOSIS.

(E.) Kahn, A. M (Wadsworth Hosp., Los Angeles, Calif.) and R. S. Ozeran. Gastroenterology 53(2):193-197, 1967.

Alterations of Zn metabolism found in rats with hepatic cirrhosis induced by i.p. inj. of 10% CCl_4 in olive oil 5 times/wk. for 10 wk. were so similar to those described in man that this albino rat preparation may provide a laboratory model for further study of Zn in the physiopatho of liver disease. The mean liver-Zn conc. of the normal rats was 29.6 µg/g (wet wt.) whereas the mean of the cirrhotic group was 25.3. The mean serum Zn conc. of the normal rats was 152.7 µg/100 ml and that of the cirrhotic rats was 128.8 µg/100 ml. In 17 cirrhotic rats the mean albumin was 2.8 g/100 ml and the globulin was 3.6 g/100 ml. The mean serum albumin and globulin of the normal rats were 3.2 g/100 ml an 3.9 g/100 ml, resp. Statistically, all these differences were significant; however, no correlation was found between the liver and seru conc. or between the serum proteins and the ver or serum Zn levels.

937 BLOOD SERUM ENZYME CHANGES IN PATIENTS WITH LIVER CIRRHOSIS. (Alban.) hami, J. E. and M. Kostaqi. Bul. Univ. Shteteror ranes 7(1):31-37, 1967.

938 LIVER CIRRHOSIS AND GASTRIC ULCERS. (Hun.) Szepeshazi, K. Orv. Hetil. 3(27):1260-1262, 1967.

939 SEVERE CIRRHOGENOUS CIRRHOSIS WITH ACANTHOCYTOSIS IN THE INFANT. (THREE SES.). (Fr.) Marie, J. (Hosp. Child. Dis., is), J. Fleury, A. Hennequet, J. C. Desbois, Cloup and J. M. Watchi. Sem. Hop. Paris 36-39):2195-2201, 1967.

40 THE STOMACH IN CIRRHOTIC PATIENTS. (Fr.) Heully, F. (Med. Clin. C, Nancy, nce), P. Gaucher and E. Astori. Ann. Med. cy 6:656-661, 1967.

41 PRIMARY BILIARY CIRRHOSIS. HANOT'S DISEASE. (Sp.) Rascovsky, S. (Durand p., Buenos Aires), A. F. Labadie and A. H. ksandravicius. Dia Med. 39(50):992-994, 1967.

42 PLASMA VOLUME AND RENAL FUNCTION IN CIRRHOSIS; EFFECTS OF CHANGING SERUM ALBUMIN CONCENTRATION AND PLASMA OSMOLALITY. (E.) McCloy, R. M. Minneapolis, University of Minnesota [Thesis, M. S. in Internal Medicine], 1966, 52pp.

11943 FIBROSIS AND CIRRHOSIS OF THE LIVER IN OPISTHORCHOSIS. (Rus.) Shmyreva, T. A. (Pirogov 2nd Moscow Med. Inst.). Med. Parazit. (Moskva) 36(4):391-394, 1967.

11944 PATHOGENESIS AND TREATMENT OF EDEMATOUS-ASCITIC SYNDROME IN LIVER CIRRHOSIS. (Rus.)(Rev.) Loginov, A. S. (Inst. Ther., Moscow) and V. M. Berezov. Ter. Arkh. 39(8): 12-20, 1967.

11945 DIAGNOSIS AND TREATMENT OF CIRRHOSIS OF THE LIVER IN CHILDREN. (Rus.) Pugachev, A. G. (Inst. Pediat., Moscow), A. G. Generalov, L. I. Malinina, L. V. Chistova, L. A. Ryzhkova, A. F. Leont'ev and Iu. N. Osipov. Vop. Okhr. Materin. Dets. 12(7):3-7, 1967.

11946 ELECTRONIC COMPUTER IN ANALYSIS OF THE MAIN CLINICAL SYMPTOMS IN LIVER CIRRHOSIS. (Rus.) Nogaller, A. M. (Astrakhan Med. Inst., USSR), K. A. Afanas'eva, S. A. Kazarov and S. F. Kurgan. Ter. Arkh. 39(3): 23-29, 1967.

11947 HEPATIC CIRRHOSIS AND ITS SURGICAL TREATMENT. (Rus.) Karavanov, G. G. Kiev, Zdorov'ia, 1966, 264pp., $1.25.

11948 EXAMINATION OF SACCHARIDE AND GLYCOPROTEIN CONTENT IN GALLSTONES. (Ger.) Józsa, L. (Bacs-Kiskun Hosp., Kecskemet, Hungary), G. Szederkényi and B. Góg. Z. Ges. Inn. Med. 22(12):368-371, 1967.

Gallstones obtained at autopsy were analyzed for their major components and for glucose, galactose-mannose, hexosamine, sialinic acid, ascorbic acid, fucose, protein, and mucoproteins. The ash content of the stones was also determined and varied from 0.5% in cholesterol stones to 79% in the limestone type; pigment stones had 1.7% ash; the other types (combinations in varying proportions of these basic types) had intermediate ash contents. Glucose was demonstrated in all stones but the greatest amount was in pigment stones (between 24 and 522 mg%) and the least in the limestones (12-60 mg%). Galactose-mannose showed great variations but, on the av., followed the distribution of glucose. Hexosamine could be demonstrated in only half the stones; the greatest amount in cholesterol and cholesterol-lime stones with ranges from 40-240 mg%. Sialinic acid was present in 96% of the stones analyzed; the greatest conc. of this acid was found in the pigment stones (126-708 mg%) and the least in the limestones (45-135%). Ascorbic acid was found in only half the stones; this compound was seldom found in the pigment stones; it varied from 84-750 mg% in limestones and was relatively less in combination stones. Fucose was found in 30 of 100 stones. In every case pigment stones contained fucose but the distribution and amount were quite variable. Protein occurred in 90% of stones from 0.4-5.5 g% in the various types; the amount varied with relatively greater conc. in the small stones. All stones had mucoproteins; they were in greatest conc. in the pigment stones and least in limestones. The content of protein and mucoprotein was largest in the center of the stones and decreased toward the periphery. Proteins and mucoproteins seem to play a part as an agglutinant in the formation of the nucleus of the stone.

11949 DIET-INDUCED CHOLESTEROL GALLSTONES IN HAMSTERS: PREVENTION AND DISSOLUTION BY CHOLESTYRAMINE. (E.) Bergman, F. (U. Umeå, Sweden) and W. van der Linden. Gastroenterology 53(3):418-421, 1967.

A total of 60 young Syrian hamsters of both sexes were divided in a strictly random fashion into 2 equal groups. Group 1, the control group, was fed a gallstone-inducing diet (glucose, 74.3%; casein 20.0%; salt mixture, 5.0%; vitamin mixture, 0.5%; and choline chloride, 0.2%). Group 2, the test group, was given the same diet with the addition of 3% cholestyramine. The number of cholesterol, mixed and pigmented stones, and no stones, in 25 animals of Group 1 was 18, 4, 1 and 2, resp., while in Group 2 (27 animals) it was 0, 0, 8 and 19. The 18 animals in Group 1 that developed cholesterol gallstones were continued on the gallstone-inducing diet supplemented with 3% cholestyramine; in 2 mo. cholesterol gallstones disappeared in 10 of 16 animals. No influence on amorphous stones was found. Of animals surviving treatment during a third mo., cholesterol gallstones were still present in 2. Histologically, livers appeared normal in all groups and no signs of fatty degeneration were found. Since amorphous pigmented stones were unaffected by cholestyramine, it is concluded that the cholesterol stones had disappeared by dissolution.

11950 TREATMENT OF REMAINING BILE DUCT CALCULI. (Pol.) Dadan, H. (2nd Surg. Clin., Bialystok, Poland), T. Jankowski, A. Dowgird and Z. Korfel. Pol. Tyg. Lek. 22(34):1286-1289, 1967.

Since gallstones can be dissolved by a mixture of 75% chloroform and 25% rapeseed oil at a temp. of 38°, this method was used to treat 5 patients with residual stones after surgery. Every 2 days approx. 2 ml of the mixture was introduced into the bile duct (through Kehr's drain in 4 cases, through a gallbladder fistula in 1 case); the mixture was kept in the duct for approx. 35 min. and the procedure was repeated 4-8 times. When a long-lasting constriction of Oddi's sphincter was necessary, 2-3 tablets of 0.02 codeine phosphoran were given p.o. or 0.01 morphine was inj. before introducing the chloroform mixture. A 1% soln. of lidocaine (Xylocaine) was used to anesthetize the bile duct when patients complained of pain following introduction of the mixture. The remnants of dissolved calculi were washed out by introducing every 2 days through Kehr's drain, a physiologic saline soln. (approx. 500 ml at 30 cm H_2O pressure) which was warmed to body temperature. This method of treatment was used on 5 patients with good results in every case; all symptoms disappeared in these patients and no side effects were observed. Follow-up studies revealed a good general condition and no complaint concerning the bile ducts. This procedure is recommended where bile duct concretions are overlooked during surgery and eliminates the need for a second operation. However it has no application in cases of organic constriction of these ducts.

11951 CORONARY ATHEROSCLEROSIS AND CHOLELITHIASIS. (Pol.) Domaniewski, J. (City Hosp., Bydgoszcz, Poland), E. Terziman and G. Domaniewska. Pol. Tyg. Lek. 22(19):704-706, 1967.

The frequency of coexisting coronary atherosclerosis and gallstones was determined and statisticall analyzed on 2550 autopsies. These consisted of 555 cases of cholelithiasis and 1995 controls. The specimens were divided into 5 groups according to severity of atherosclerotic changes and 8 age groups of patients (from 20 to over 90 yr. old). There were 3 times as many cases without coronary theromatosis in the control groups than among hose with cholelithiasis. The atherosclerotic hanges were classified as severe in over 50% of he patients with gallbladder disease (as com- ared to 33% of the controls), appeared at a ounger age and were independent of sex. These ifferences were statistically significant.

1952 Rh FACTOR AND ABO BLOOD GROUPS IN PATIENTS WITH CHOLECYSTITIS. (Pol.) Korfel, Z. 2nd Surg. Clin., Bialystok, Poland), P. Podsiadły nd L. Ostrowski. Pol. Tyg. Lek. 22(10):339-341, 967.

e results of a statistical analysis of ABO blood oups and Rh factor distributions among 912 pa- ents (151 men, 761 women) with cholecystitis d 5372 healthy subjects (3095 men, 2277 women) e presented. Only patients whose diagnosis of olecystitis was confirmed by microscopic exam- ation after surgery and only people living in e same general area were included. Statistically gnificant differences were found in the dis- ibution of A and O blood groups. There was a re frequent occurrence of blood group A among tients with cholecystitis (46.4% of men, 47.0% women) when compared to healthy subjects (37.0% men, 37.2% of women) while there was a less equent occurrence of blood Group O among chole- stitis patients (23.2% of men, 28.0% of women) an among the control group (36.7% of men, 36.1% women). There were only slight, statistically significant differences in the distribution of e Rh factor and B and AB blood groups. It is ggested that people belonging to blood group O e less susceptible to cholecystitis while those longing to blood group A have a greater chance developing this disease than other people.

953 RECTAL CHOLECYSTOGRAPHY. (E.) Sargent, E. N. (Orange County Gen. Hosp., Calif.), H. Guth and M. Graffman. Radiology 88(5): 7-1001, 1967.

e effectiveness of sodium ipodate and calcium odate as cholecystographic contrast media, ctally admin., is reported in 43 patients (25 le and 18 female subjects aged 30-80 yr.) with- t demonstrable hepatobiliary disease. In those patients who retained the medium, 22 (58%) nonstrated visualization of the gallbladder ich was considered diagnostically adequate (60% th the Na salt and 57% with the Ca salt). sualization was considered better than the ical oral cholecystogram in 18 (47%) patients. sualization to some degree was obtained in a tal of 87% of the patients. A high percentage those receiving the Na salt experienced dif- culty in enema retention. Most patients demon- rated an adequate visualization of the gall- adder within 6 hr., while 4, 2 and 1 patient quired 8, 10 and 12 hr. resp., for biliary vis- ization. Retrograde flow of the contrast medium not correlate with the quality of the chole- togram. There was no significant liver or kidney toxicity as well as other observed side effects. This procedure is recommended as a substitute for oral cholecystography when the latter procedure is not feasible.

11954 ON THE TECHNIQUE OF CHOLECYSTECTOMY AND CHOLEDOCHOSTOMY. (E.) Seiro, V. (U. Helsinki) and K. Kettunen. Acta Chir. Scand. 133(4):320-322, 1967.

There are 2 conventional technics of cholecystectomy; in 1, the cystic artery and cystic duct are ligated before the gallbladder is freed, beginning from the cystic duct; in the second, removal of the gallbladder is begun from the fundus and the cystic duct and cystic artery are not ligated until the final stage. A new technic of cholecystectomy is described in which sharp dissection of the gallbladder is begun at the fundus and continued to the neck; the organ is displaced laterally, and by palpating the hepatoduodenal ligament between the fingers the anatomy of the vessel of the liver is established and any vascular anomalies are localized; peritoneum of the ligament is incised and the anterior wall of the common bile duct and of the hepatic duct, as well as of the cystic duct, are exposed; the cystic artery is ligated after identification, and not until after its ligation is the cystic duct severed. The gallbladder fossa and hepatoduodenal ligament are left unsutured; drainage is always applied to the operative field. A new choledochostomy technic is also described, using a needle technic. A thin inj. needle is inserted through the anterior wall of the common bile duct; by raising the needle ventrally, the anterior wall of the common bile duct and incision is made along the needle. Both of these technics have been used successfully with minimal complications in a large teaching hospital in which most of the (500) bile duct operations done annually are performed by resident surgeons.

11955 STRICTURE OF THE GALL BLADDER. (E.) Beilby, J. O. W. (Middlesex Hosp., London). J. Path. Bact. 93(1):175-184, 1967.

Study of 40 gallbladder strictures in adults and 1 in a 10-yr.-old child revealed that all of them contained muscle. In an examination of 72 neonates, 11 basically similar strictures were found. The sex ratio in both adult and neonatal groups was 3 females to 1 male. Strictures seen in adults were considered to be congenital in origin. From a study of 3 human embryos, it appeared likely that such strictures arose by incomplete vacuolization of the solid embryonic gallbladder bud. The gallbladder wall distal to adult strictures usually showed epithelial sinus and crypt formation with muscular hypertrophy, progressing to "cholecystitis glandularis proliferans", where the stricture is narrow. Such changes were never observed in infants or neonates. The gallbladder wall changes appeared to result from raised intracystic tension, and to be best regarded as a form of diverticulosis. The association of "cholecystitis glandularis proliferans" with strictures of narrow lumen, the strict localization to the wall distal to the obstruction, the muscular hypertrophy and the flattened epithelium lining the crypts were all indicative of an obstructive etiology, possibly coupled with raised intracystic pressure.

11956 BILIRUBIN ENCEPHALOPATHY IN THE GUNN RAT: A FINE STRUCTURE STUDY OF THE CEREBELLAR CORTEX.

(E.) Schutta, H. S. (Pennsylvania Hosp., Philadelphia) and L. Johnson. J. Neuropath. Exp. Neurol. 26(3):377-396, 1967.

Cerebellar pathology, as revealed by both light and electron microscopy, in 55 homozygous rats with experimental jaundice is described with emphasis on the fine structure of the cerebellar cortex, as well as the absence of such pathology in newborn rats, occurrence of cerebellar alteration in rats without clinical manifestations of pathology, and association of cerebellar alteration with serum albumin and bilirubin conc. Localized staining of the basal ganglia and cerebellum was not visible until 24 hr. after birth. The cerebellum was smaller than normal at 10 days postpartum, and the hemispheres consisted of only 2 thin leaves 30 days after birth. In jaundiced rats showing no ataxia, light microscopy revealed only cerebellar abnormality in the Purkinje cells. Atrophied hemispheres, however, revealed diminished cell populations in the granular, molecular and Purkinje layers, as well as a derangement of the lobular pattern of the cerebellum. Employing osmium-fixed sections, abnormalities were noted earlier, with osmiophilic granules and whorled structures being noted in the cytoplasm of some Purkinje cells. Electron microscope analysis revealed abnormalities in the cytoplasm of the Purkinje cells as early as 30 hr. after birth. The incidence of cerebellar abnormality was in direct proportion to the severity of the cerebellar ataxia and abnormalities were observed uniformly in all jaundiced rats over 3 days of age.

11957 BIOPHYSICS OF LIPID ASSOCIATIONS. III. THE QUATERNARY SYSTEMS LECITHIN-BILE SALT-CHOLESTEROL-WATER.

(E.) Bourgès, M. (Pasteur Inst., Paris), D. M. Small and D. G. Dervichian. Biochim. Biophys. Acta 144(2):189-201, 1967.

The amount of cholesterol that can be incorporated into the different aqueous phases, paracrystalline or micellar (isotropic soln.) in the presence of lecithin and bile salt was studied, using the quaternary systems formed with lecithin, bile salt, cholesterol and water. The different phases formed by the quaternary mixtures were studied by both the ordinary and polarizing microscopes, and their paracrystalline molecular structure was determined by X-ray diffraction. A quaternary diagram was employed, representing the composition of the regions of existence of single phases or the equilibrium of the different phases: isotropi micellar soln., paracrystalline lamellar, hexagona and cubic phases. These phases were identical with those obtained with the ternary systems lecithin-bile salt-water. Cholesterol could be incorporated into each of these phases without any important modification in their structure, and no new phase appeared as a consequence of this addition of cholesterol. The solubilization of cholesterol obtained by the simultaneous presence of lecithin and bile salt is stressed. Bile was compared to 1 of the quaternary systems examined, and containing 0.5% cholesterol, 85% water, 11.5% bile salt and 3% lecithin. The compositions of normal human (and animal) bile lay within the micellar zone IV, whereas the compositions of bile from patients having cholesterol gallstones was just outside this zone, in the region of 2 phases where cholesterol crystals separate from the micellar phase. Regardless of the mode of growth of cholesterol gallstones, a prerequisite for stone formation is a bile which is oversaturated with cholesterol, i.e., a bile with a composition outside zone IV.

11958 PROBLEMS OF REFLUX INTO PANCREATIC DUCT (WIRSUNG'S DUCT).

(Cz.) Moravec, R. (Fac. Med., Bratislava, Czechoslovakia), J. M. Bencúr and F. Mlček. Cesk. Radiol. 21(4):238-244, 1967.

In more than 300 cases studied by cholangiography during or after surgery, reflux into Wirsung's duct was found in 60 patients (20%). The length of reflux was 0.5-3.0 cm in 22 patients, 3.5-5.0 cm in 18, 5.5-10.0 cm in 10, 10.5-15.0 cm in 3 and 15.5-20.0 cm in 7; width of reflux was 0.5-3.0 mm in 34 patients, 3.5-5.0 mm in 22, 5.5-8.0 mm in 4. Diastases, lipases and Ca values were normal, and the patients were subjectively well. It is the authors' opinion that reflux could be caused by such factors as the anatomy of the biliopancreatic pathways, the action of drugs, the hypertonic condition of the bile duct, high pressure (more than 35-40 cm of H_2O), chronic pancreatitis, position of patient at examination, X-ray technic, frequency and start of radiologica examination, and quantity and conc. of contrast material. One case history is given in some detai

11959 PREDNISOLONE TREATMENT OF PATIENTS WITH CHRONIC CHOLANGIOHEPATITIS.

(Rus.) Simbiriakova, K. I. (Donets Med. Inst., USSR). Vrach. Delo (9):16-19, 1967.

11960 DIET IN LIVER AND BILIARY DISEASES.

(Ger.) Schmidt, D. and J. Schicht. Berlin, Verlag Volk and Gesundheit, 1966, 119pp., $1.25.

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62 CHOLEDOCHOCELE OR CYSTIC DILATATION OF THE AMPULLA OF VATER. (Fr.) Henrion, Acta Chir. Belg. 66(2):139-152, 1967.

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64 DIAGNOSIS AND THERAPY OF CHRONIC CHOLANGITIS IN INFANTS. (Ger.) tmer, A. (U. Child. Clin., Berlin). Z. derheilk. 100(4):315-324, 1967.

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7 CHOLECYSTIC DISEASES IN THE AGED. (E.) Glenn, F. (New York Hosp.-Cornell Med. , N. Y.) and C. K. McSherry. Geriatrics):106-114, 1967.

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9 FUNCTIONAL CHANGES OF THE LIVER IN CHRONIC CHOLECYSTITIS. (Rus.) vadian, A. M. (Pirogov 2nd Moscow Med. Inst.), . Vasil'ev, A. G. Chuchalin and B. K. kalin. Klin. Med. (Moskva) 45(7):81-85, 1967.

CLINICAL STUDY OF CHRONIC ANGIO-CHOLECYSTITIS. (Rus.) Geller, L. I. parov Med. Inst., USSR). Vrach. Delo (9):23- 1967.

DIAGNOSTIC VALUE OF HYPOTONIC DUODENOGRAPHY IN CALCULOUS CHOLECYSTITIS. (Rus.) Pishchin, E. M. (Novosibirsk Reg. Clin. Hosp. No. 12, USSR). Klin. Med. (Moskva) 45(8): 99-102, 1967.

11972 BLOOD SERUM AND URINARY POTASSIUM, SODIUM AND CHLORINE CONTENTS IN PATIENTS WITH ACUTE CHOLECYSTITIS BEFORE AND FOLLOWING SURGERY. (Rus.) Mamchich, V. I. (Kiev Inst. Postgrad. Med., USSR). Klin. Khir. (Kiev) (7):17-20, 1967.

11973 BILE STONES OF THE COMMON BILE DUCT. PROBLEMS IN DIAGNOSIS BEFORE AND DURING OPERATION WITH RESPECT TO SURGICAL THERAPY. (It.) Li Voti, P. (U. Palermo, Italy) and F. Cataliotti. Minerva Chir. 22(15):849-855, 1967.

11974 PEROPERATIVE BIOPSY OF THE LIVER AND PANCREAS IN CHOLELITHIASIS AND DIABETES MELLITUS. (Rus.) Susman, I. G. (Pirogov 2nd Moscow Med. Inst.) and M. V. Zhuravleva. Eksp. Khir. Anest. 12(4):25-28, 1967.

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11976 THREE CASES OF "PORCELAIN CALCULI". (It.) Garinei, R. (Civil Hosp., Montefiascone, Italy). Ann. Ital. Chir. 43(3): 476-489, 1966.

11977 GENERAL PROGNOSIS OF CHOLELITHIASIS. (Fr.)(Rev.) Dubrisay, J. Rev. Prat. (Paris) 17(22):3111-3116, 1967.

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GASTROENTEROLOGY

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U.S. DEPARTMENT OF
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis and Metabolic Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication of GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available, free to qualified interested investigators and practitioners, citations of all current papers relevant to this field from medical journals published throughout the world. In the abstract issues, approximately one-third of the citations dealing with the major aspects of gastroenterology had accompanying abstracts.

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  liver: 248,756,798,1709,1717,1718,2643,2707,3473,3487,4378*,5395,5396,6400,6401,6403,6404,7404,7409,8013,8461*,9542 9658,10615*,10661,11726*,11836,11837,118

- AMEBIASIS (Contd.)
  - treatment: 208*,244,248,249,250,252,1167,1170,1709,1717,2123,2135,2203,3066,3068,3085*,3473,3880,3881,3882,3883,3924,5242*,5858,6841*,6868,6869,6870,6871,8012,8013,8907,8908,9154,9542,9955,9956,10615*,11836,11837
- AMMONIA (see Liver)
- AMYLASE (see also Pancreas): 88*,100*,111,1061*,1064,1151,1155*,1593,1911*,1975*,2010,2111,2932*,2936,3025,3049,3406,3804,3916,4522,5329*,5636*,5733,5849*,6306*,6434,6718*,6719*,6847*,7579*,7844*,7927*,8812*,9231,9418*,9821,9822,9823,10564*,11178
- AMYLOIDOSIS: 775,1613*,1645,1653,1660,2149*,2215,2441,2693,2694,4405,6331*,6978,7364*,8056,8946,10075,10422,11110,11584
- ANEMIA (see also Cirrhosis; Malabsorption, treatment, vitamin B_{12}, Folic Acid; Malabsorption, iron; Liver, diseases): 101*,390,391,737,979*,1003*,1019*,1337*,1966,2280*,2281*,2282*,2296*,2335,2892*,3134,3185*,3186*,3190*,3226,3429*,3545*,4056*,4152,4227,5029*,5033*,5036*,5157*,5468*,6048*,6053*,6295*,6296*,6430,6661*,6697*,6701*,7050*,7293*,7473,7775*,7777*,7782*,7816*,7829*,8127*,8179*,8230,8240*,8277*,8279*,8339,8398*,8713*,8715*,8716*,8717*,8752,8949*,9018*,9024*,9143*,9510,9520,9647*,9832*,10070,10165*,10188,10261*,10292,10408*,10412*,10540*,10569*,10579,10693,10968*,10976*,10980*,10984*,10986*,10990*,11024*,11056*,11319*,11350,11351,11366,11518*,11542*,11946
- ANEURYSMS: 2684,2685,4381*,4427*,5410,5949,6445,6850,7475,8079,8499,10040
  - aortic: 339,341,2137*,2156,2163,2171,3026*,3109,3918*,3951,4861,4952,4953,4954,5566*,5944,5945,5948,5950,5951,6853,6909*,6941,6942,6943,6944,8078,8080,8081,8925,8982,8983,8984,8985,9004,10041,11163*,11276,11277,11278
- ANOREXIA NERVOSA: 328,2214,3906*,4877*,4956,4957,5037*,8067,8068,8915,8945,8980,10069,11230,11805
- ANTACIDS: 406*,2941,2956*,3193,3731*,4098,4115,4729,7033*,7092,7180,8169*,8281*,9236,9819,10169,10388,11498
- ANTIBIOTICS: 77*,83*,148*,174,207*,222,273*,288,483*,839,922,923,996,1081*,1117,1118,1160,1161,1174,1175,1178,1374*,1549*,1730*,1825*,1905*,2125,2126,2132,2134,2888*,3037*,3038*,3069,3107,3882,3889,3892,3893,3902,3903,3934,4552*,4629*,4839*,4840*,4851,4852,4857,4858,4860,4869,4929,5284,5606,5607,5843*,5855,5882*,5973,6116*,6163*,6342*,6483,6614,6753,6796,6872,6878,6881,6882,6890,6892,6895,6902,6903,7060,7211*,7529,7560*,7672,7707*,7708*,7993*,7997,8000,8021,8052,8089,8098,8246*,8329*,8340,8431,8477*,8578,8619*,8720*,8744,8750,8821,8878,8906*,8940,8942,8943,9097,9322,9363,9365*,9366*,9412*,9432*,9433*,9441*,9442*,9443*,9481*,9653*,9859*,9902,9904,9935*,9962,9964,9965,9975,9980,10171,10264*,10404*,10410*,10413*,10451,10599*,10665,11162*,11164*,
- ANTIBIOTICS (Contd.): 11183,11186,11191,11224*,11330*,11540*,11641*11643*,11658,11704*,11795,11821
- ANTICHOLINERGIC AGENTS: 66*,102*,132*,401*,417*,524*,992,1069*,1079*,1085*,1093,1408*,1413*,1969*,1987*,1992*,1995*,2017*,2022*,2922*,2923*,2944,2954*,2961*,3172*,3736*,3747*,3748*,3749*,3768*,3774*,3879,4168*,4704*,4712*,4717*,4758*,4765*,4774,4775,5140*,5154*,5159*,5244*,5343*,5696*,5708*,5709* 5718*,5726*,5770*,5773*,6152*,6162*,6194,6711*,6744*,6748*,6912*,7053*,7180,7797*,7804*,7807*,7809*,7811*,7818*,7881*,7882*,7895*,7903*,7906*,7920,7921,8281*,8556,8690*,8706,8772*,8804*,8805*,8807*,8808*,8810*,8857,8860,9023*,9052*,9210*,9213*,9237,9720*,9734,9770*,9771*,9778*,9790*,9797*,9798*,9801*,9805*,9812*,9820,9838*,9840*,9848*,9850*,9899,10203,10384,10571*,11032*,11039*,11049*,11050*,11051*,11068*,11070*,11074*,11143,11147,11168,11212,11448*,11498,11704*,11857*
- ANTIEMETICS (see Vomiting)
- ANTISPASMODICS (see also under Motility and under specific organs): 205*,216,234,235,236,331,1172,1173,1185,1186,2025*,2833,2964,3052,3627,3778*,3879,4773,4774,4775,6194,6897,7663,7920,8017,8018,8556,8804*,8808*,8860,9210*,9314,9899,9978,9979,10714,11068*,11143,11147,11167,11330*
- ANUS: 2526,10452
  - anomalies: 656,1515,1516,2521,3360,4269,4270,4271,5280,5282,6279,7259,7260,9341,10477,11569,
  - children: 7228*
  - circulation: 6275
  - diagnosis:
    - biopsy: 9316
    - radiology: 1494*,4269,7260
  - diseases: 645,1506,1507,1508,2510,4249*,4290,6267,7286,8383,8385,9313,9320,10476
  - fistula: 626,2510,4249*,5277,10519*,11593
  - morphology: 1515,4249*,4250*
  - motility: 6221*,6228*,7892*,11076*
    - pressure studies: 11576
  - neoplasms: 10510
    - malignant: 607,626,1517,1523,2503,3369,4306,5250*,5253,6240,7235*,8359*,8391,9352,9357,9358
  - nervous control: 6221*
  - obstruction: 4264,4274,11577
  - pruritus ani: 949,8384,10474,11578,11732*
  - sphincters: 1515,4249*,5243*,5280,8352*,8803*,9330,10514,11076*
  - surgery: 654,1506,1516,1523,3357,3360,4267,4268,4274,4277,5243*,5286,6221*,6235,6267,7259,9313,9316,9327,9330,9332,9341,11576,11614
  - toxic effects
    - radiation: 4251*
- AORTOGRAPHY (see Gastrointestinal tract, diagnosis)
- APPENDICITIS: 595*,600,603,606,615,631,1348,1492*,1497*,1503*,1542,1544,2302*,2474*,2485,2488,2489,2495,2508,2516,2522,2524,

APPENDICITIS (Contd.): 3074*,3334*,3343,3344,
3345,3347,3348,4293,4294,4297,4299,5259,5261,
5263,5264,6268,6269,6270,6271,6272,7263,7265,
7266,8947*,9062*,9298*,9299*,9300*,9360,9844*,
10000*,10001*,10017,10392*,10393*,10473,11551*,
11552*,11572,11573,11574,11575,11892
  aging: 600,603,5258
  children: 4878*
APPENDIX: 647,650,652,1543,2490,2515,3346,4285,
4295,4296,5022*,5260,5262,5265,5631*,5959,
6125,6227*,6268,6271,6272,6273,7200*,7234*,
7250,7264,7288,8377,8378,9160,9298*,9299*,
9301*,9361,9363,10508,10509,11551*,11552*,
11574,11575
ASCITES (see Abdomen, ascites; Cirrhosis,
ascites): 2620*,2657,5445
ATHEROSCLEROSIS: 3084*,3601*,5409,7129,7463,
7467,7635*,8081,8424,8508,8621,8886,9207*,
9287,9485*,9659,9932,10360,11087*,11228*,
11443*,11951*

BACTERIA (see Microorganisms)
BEZOARS: 4110,6975,7107,10272*
BILE: 940,950,1188,2740,3905,5607,5615,6061,6614,
6762,7469,7692,7702,7978,7979,8719*,8850,
9443*,9526,9633,9802*,9904,10571*,10587*,
10689,10990*,10991*,11870,11970
  composition: 165*,171,183,919*,921*,973,974,
  1154,1593,1828*,1851,2004*,2036*,2045*,
  2056,2079,2966,2970*,2971*,3017,3489,3594,
  3803,3810,4429,4820,5572*,5579*,5784*,
  5787*,5788*,5800*,5802*,6594*,6595*,6715*,
  6716*,6768*,6810,6830,7564*,7847*,7977,
  8735,8824*,8825*,8852,8853,9861*,9864*,
  9865*,9923,10343*,10591*,10688,11084*,
  11086*,11097*,11104*,11146,11980,11981
  digestive action: 2007,2008*,4694,6694,
  7312*,7745*,7787*
  microorganisms: 6594
  secretion: 71*,144*,152*,157*,164*,932,1050*,
  1051*,1104*,1106*,1623*,1830*,1844,1851,
  1861,1969*,2003*,2004*,2036*,2051*,2055*,
  2066,2097,2649,2729*,2924*,2966*,2969*,
  3627,3762,3799*,3805*,4392*,4399*,
  4610,4747,4782*,4783*,5325,5726*,5762*,
  5783*,5787*,5793*,5802*,5806*,5816,6715*,
  6715*,6776*,6782*,6809,6820,7663,7847*,
  7873*,7936*,7938*,7940*,8479*,8535*,8556,
  8772*,8773*,8780,8824*,8825*,8829*,9455*,
  9572*,9678*,9814*,9864*,9877,9929,10591*,
  11034*,11084*,11085*,11088*,11104*,11133,
  11134,11135,11749*,11757*
BILE ACIDS AND SALTS (see also Absorption):
40*,46*,114*,115*,174,481*,895,949,1104,1113*,
1114*,1153,1154,1823*,2008*,2037*,2038*,2055*,
2056,2068,2075,2800*,2896,2966*,2981*,3516*,
3594*,3830,3831,4694,4791,4817,4818,4819,
5353*,5575*,5794*,5806*,6768*,6770*,7312*,
7787*,7884*,7980,8634*,8719*,8794,8824*,9142*,
9270*,9814*,9904,9931,9932,9997*,10587*,11957*
  analytical procedures: 183,1123,2059,4622,
  5800*,7378*,9494*,9607*
  metabolism: 181,3793*,3795*,4426,4455,4587,
  5578*,5787*,5807*,5815,6741,6831,6832,6836,
  7847*,7936*,8843,9890,9914,9992*,10400*,
  11083*,11087*,11136,11732*,11740*
BILE DUCT (see Biliary Tract)
BILE PIGMENTS (see also Bilirubin; Cholestasis;
Jaundice, serum bile pigments): 2968*,2983*
2984*,3007,4455*,6475,7381*,7982,8535*,10711
11137
BILIARY TRACT (see also Gallbladder; Cholecystitis; Cholelithiasis): 6441,6782*,8653,8670
8671,8673,10083
  aging: 7727*,8654
  ampulla of Vater: 492,673*,697,915,1847,185
  1880,1881,1882,2309,2820,2829,2834,3268,
  3394,3609,4156*,4339,4340,4605,6293*,6589
  7642,9485*,9669*,9674*,11671*,11962,11984
  11994
  anomalies: 765,784,914*,930,953,1002,1620*,
  1826*,1831*,1897,2632*,2827,3605,4601,
  4608,4627,5361*,5567*,5618,5619,5620,5621
  6325*,7476,7477,7651,7656,7667,8470*,8683
  9094.9675*.12012.12013
  associated diseases: 569,910*,930,940,972,
  1853,3596,3601*,4413,4515,4538,5568*,
  6285,6593*,7377*,9700
  biochemistry, enzymes: 2824
  children: 929,1002*,1858,4515,4585*,4597,
  5568*,7652,8641,10727,11964
  circulation: 911*,2810,6527,6599*,8708*
  common duct: 32,693*,931,935,938,939,947,
  952,954,958,970,977,1826*,1831*,1842,1848
  1854,1859,1881,1896,2560,2622*,2803*,2805
  2806*,2812,2814,2817,2830,2831,2834,3433*
  3597*,3604,3611,3632,3634,3638,3768*,3778
  3910*,4390*,4584*,4586*,4588*,4592,4599,
  4601,4612,4619,4624,5349*,5362*,5571*,
  5581,5585,5590,5616,5625,6294*,6325*,6599
  6600*,6625,6630,6717*,6718*,7445,7637*,
  7640*,7646*,7650,7651,7669,7670,7671,7727
  7873*,7902*,8440,8478*,8628*,8629*,8632*,
  8633*,8634*,8636*,8651,8663,8668,8708*,
  8711,8766*,9069*,9408*,9485*,9662*,9663*,
  9666*,9667*,9668*,9670*,9671*,9673*,9674*
  9680*,9681*,9688,9694,9706,9714,9715,1038
  10607*,10617*,10618*,10810,11208,11466,
  11671*,11674*,11720*,11736*,11740*,11950*
  11954*,11962,11973,11982,12007,12011
  development: 32,1831*,6454,6590*
  diagnosis: 948,959,960,976,1840,1849,2812,
  3041,3593*,3596*,3600*,3619,3868,4611,
  4612,6330,7649*,7654,9693,9710,10549,10640
  11964,11983,12007
    biochemical procedures: 10607*
    biopsy: 12001
    cholangiography: 225,679,915*,924,928,934
    939,945,947,1816*,1822*,1826*,1829*,
    1867,1868,1869,1870,1871,1872,1873,
    1874,1875,1876,1879,1886,2667
    endoscopy: 3639,6616,6621,8629*,9666*,
    11982
    radiology: 2804*,2805*,2817,2826,3034*,
    3489,3591*,3609,3613,3630,4138,4610,
    5568*,5595,5597,5626,6297*,6603*,6615,
    6618,6619,6621,7424,7642*,7644*,7652,
    7661,7667,7676,8633*,8658,8659,8660,
    8661,8662,8665,8666,9549,9662*,9663*,
    9674*,9678,9699,9700,9716,10661,11135,
    11486,11736*,11953*,11958*,11982,11984,
    11985,11986,11987,11989,11990,11991,
    11992,11993,11998,11999,12000,12003
      angiography: 3625,3629,4374*,4582*,

BILIARY TRACT, diagnosis, radiology, angiography, (Contd.): 4596,4598,4609,4617,4627,5573*,5722*,11208
  diseases: 720*,921*,922,923,929,935,948,954,1820*,1844,1853,1858,1867,2579,2808,2810,3592*,3608,3624,3634,3910*,4595,4624,5394,5525,5575*,5605,5606,5607,5609,5624,6506,6589*,6592*,6609,6628,7443,7637*,7650,7653,7654,7655,7662,7668,7672,7673,8166*,8534,8667,8668,8669,8672,8675,9536,9589,9674*,9685*,9688,9708,9710,9713,9977,10566*,10605*,10639,10640,10646,10709,10727,10729,10810,11770,11783,11809,11960,11962,11963,11964,11990,11999
  diverticula: 4601
  epidemiology: 11783
  fistula: 482*,928,960,1863,1864,1865,6606,8681,8682,8825*,8964,9009,9692,9701,9814*,10382,11466,11965
  hemobilia: 1849,2807,4597,6613,8527,9561,9562,9693
  ileus: 946,9190,9701
  metabolism: 4699*,4786*,8821
  microorganisms: 3489
  morphology: 32,1002*,1610,3434*,4627,7526*,7665,7727*,8708*,8711,9716,10617*
  motility: 913*,1858,2025*,3608,3624,3768*,3778*,3799*,7902*,7903*,8898
    pressure studies: 911*,915*,2805*,3489,4595,9673*,10618*,10917*,11988,
  neoplasms: 1847,7424,7432
    benign: 7669,8676,9705
    malignant: 673*,856,2829,3596*,3600*,3607,3615,4339,4590,5722*,6285*,8042*,8440,8632*,8636*,8679,9485*,9683*,9706,10684,11671*,11736*,11744*
  nervous control: 910
  obstruction: 158*,706*,938,951,1822*,2799*,2830,3433*,3600*,3632,4374*,5362*,5366*,5612,5616,6294*,6589*,6590*,6599*,6600*,6601*,6603*,6717*,6769*,7359*,7360*,7377*,7640*,8481*,8686,9671*,9696,10618*,11677*
  pathology: 1859,10715
  perforation: 4585*
  sphincter of Oddi: 915*,943,971,975,1829*,1880,1883,1884,1885,1886,1887,1888,1889,1890,1891,1892,1893,1894,1895,1896,2805*,2833,3034*,4616,4624,6589*,6610,7637*,7642*,7657,7658,7659,7873*,7884*,7903*,8446*,8629*,8649,8650,9663*,9678*,11677*,11950*,11984,12001
  stricture: 4593,4594,4605,4613,4614,6627
  surgery: 914*,922,931,936,943,950,952,953,957,960,962,965,968,970,971,1002*,1387,1817*,1826*,1849,1860,1880,1881,1882,1883,1884,1885,1886,1887,1888,1889,1890,1891,1892,1893,1894,1895,1896,2799*,2802*,2803*,2806*,2814,1817,2818,2823,2827,2828,2831,2832,3469,3592*,3598*,3602,3611,3614,1615,3618,3625,3626,3631,3632,3638,3639,3859*,3868*,4339*,4412,4584*,4588*,4592,4599,4605,4612,4615,4616,4619,4625,4626,5569*,5574*,5581,5585,5590,5593,5594,5622,6294*,6374,6589*,6592*,6600*,6601*,6615,

BILIARY TRACT, surgery (Contd.): 6623,6629,7445,7636*,7643*,7646*,7647*,7651,7656,7657,7658,7659,7660,7664,7666,7670,7671,7688,8518,8628*,8629*,8630*,8639,8640,8641,8642,8648,8649,8650,8651,8652,8654,9412*,9663*,9669*,9670*,9680*,9694,9714,9715,9717,10591*,10718,10719,11680,11954*,11972,11988,12000,12002,12003,12004,12005,12006
    toxic effects
      chemical: 6454,8660
  transplantation: 4584*
  trauma: 2814,2815,4597,4626,6629
BILIRUBIN: 140*,145*,147*,156*,158*,159*,481*,867*,912*,1610*,1619*,1821*,1834*,1835*,1969*,2037*,2045*,2054*,2618*,2649,2673,2683,2729*,2816,2819,2968*,2970*,2971*,2980*,2983*,2984*,3024,3430*,3434*,3441*,3566,3596,4378*,4430,4587*,4699*,4782*,4790*,4825,5359*,5366*,5542,5565*,5566*,6336*,6338*,6339*,6340*,6466*,6475,6564*,6587*,6590*,6595*,6596*,6600,6715*,6716*,6775*,6779*,7362*,7376*,7381*,7391*,7563*,7575*,7590*,7648*,7746*,7940*,7957,8463*,8466*,8467*,8469*,8535*,8570,8588*,8633*,8773*,8824*,8825*,8855,8856,8866,9142*,9374*,9443*,9468*,9471*,9480*,9494*,9573*,9597*,9598*,9606*,9608*,9644*,9646*,9665*,9671*,9859*,9862*,9867*,9934*,10594*,10596*,10607*,10618*,10686,10790*,10800*,10842*,11084*,11088*,11156*,11158*,11728*,11732*,11733*,11734*,11735*,11740*,11750*,11756*,11758*,11868,11869,11879*,11880*,11883*,11886*,11956*
BIOPSY (see diagnosis under individual organs)
BLEEDING (see also Ulcer, peptic): 270*,338,341,342,343,412*,511,898,1266,1267,1268,1287*,1420*,1429,1442,2143*,2173,2248,2345,2839*,3090,3092,3093,3096,3097,3622,3952,3953,3954,3955,3956,4151,4152,4253,4254,4416,4439,4618,4739*,4887,4888,4891,4892,4974*,4975*,5087,5260,5946,5947,6261,6569*,6774*,6937,6938,6940,7139,7279,7450,8082,8114,8127*,8231,8287*,8302*,8363,8636*,8964,9036,9066*,9087*,9113,9147*,9192,9194,9219*,9325,9470*,9482*,9484*,9562,9628,9704,9719*,10002*,10114,10153*,10196,10197,10198,10412*,10436*,10437*,10518*,10519*,10566*,10594*,10608*,10621*,10627*,10828*,10841*,11075*,11203,11215*,11268,11269,11270,11274,11280*,11326*,11398*,11540*,11946
  aging: 5086
  children: 5942,5943
  diagnosis: 229,264*,265*,337,521*,596*,659,802,1191,1539,1711,2115,2172,2228,2245,2287*,2376*,2807*,3089,3094,3863,4831*,4886,4889,5178,7985*,8170*,8215,9106,9329,9938*,10001*,11204,11271,11322*
    biochemical procedures: 8931
    endoscopy: 9067*,9071*,11272
    radiology: 7996,8932,11340
      angiography: 9951
  etiology: 9218*,10030,10159*,10300,11275,11311
  treatment: 340,1200,2113,2114,2115,2116,2117,2136,2170,2228*,3029*,3864,4067*,4889,5088,5089,5134*,5943,7114,8930,8952*,10003*,11159*,11204,11271,11273,11475

- BLEEDING (Contd.)
  - treatment (Contd.)
    - cooling: 405*,443,1196,2174,2352,2419,3851*,4066*,4109,5102,6105,6867,8001,9105,10199
    - surgery: 1344,2332,3091,3095,4097*,6101,6939,8933,10200,10336*,11474,11488
- BLOOD COAGULATION (see also under Cirrhosis): 1402,2175,2176,2391,2404,2994,4728*,4885,4890,5798*,5790*,6483,6816,7121*,7139,8044,8045,8295*,9147*,9168,9229,9300*,9440*,9488*,9553,9891,9995*,10003*,10250,10589*,10648,10805
  - liver disease: 710*,711*,754,1105*,1599*,1604*,1732*,2617*,3571,3577*,4521,6336*,6413,7358*,7472,7516*,7569*,7584*,8603,9482*,9489*,9638*,11798,11815
  - pancreatic disease: 1580*,9410*,11711
- BLOOD GROUPS (see under Genetic Relationships)
- BRADYKININ: 13*,70*,117*,123*,1068*,1078*,3028*,3769*,5630*,5773*,5777*,6037*,6757*,7807*,7891*,9720*,9845*,10537*
- BUDD-CHIARI SYNDROME: 1663,2624*,2647,3460,4375*,4400,5419,6455*,7404,7480,8493,9486*,9527,9528,10623*,11796

- CANCER (see also neoplasms, malignant under individual organs): 1261,1285*,1307,1332*,1336*,1363,1371,1519,1522,2182,2183,2697,2701,6248,9077*,9114,9337,9354,9504,10245,10250,10255,10509,10684,11633,11681,11829
  - aging: 10504
  - associated diseases: 5172,5188,5307,6219,6289,6907*,6955,7063,7070,7324,7422,8041*,8333*,8336*,8516,9024*,10246,10254,10301,10437*,10466,10496,10566*,11367*
  - children: 6242,7421,8062,9406,10497,10503,10504,10668,10670
  - clinical studies: 6018,6076,6247,7025,8034*,8168*,8442,8445,8514,9405,10228,10233,11545*
  - diagnosis: 727*,1182,1183,1306,1312,1355,1369,1521,1691,1694,1702,2188,2328,2353,2565,2696,2702,2703,3040,3180*,3220,3221,3223,3225,3250,3335*,3369,3874,3875,4023,4053*,4057*,4058*,4076,4078,4080,4085,4300,4372*,4396*,4440,4862,5019*,5021*,5073,5078,5083,5130,5322,5349*,5374*,5381*,5401,5402,5406,6026,6047*,6326*,6843*,7031*,7062,7231*,7233*,7243,7245,7248,7322,7431,7572*,7685,7984*,8180*,8186,8190,8191,8443,8445,9055*,9079*,9087*,9351,9374*,9450*,10212,10235,10238,10240,10329,10499,10500,10506,10597*,10647,10669,11047*,11283*,11368,11373,11381,11384,11540*,11678*,11744*,11831
    - biochemical procedures: 6394,7059,7060,7853*,8172*,8475*,9349,9373*,9462* 9995*,10172,10234,10246,10247,10251,10252,10253,10443*,10446*,10538*,10607*,10730,11312*,11383*,11385*,11748,11670*,11671*,11751*,11832,11834
    - biopsy: 9112,9297*,9347,9454*,10146*,10234,10236,10237
    - endoscopy: 9068*,9366*,10166*,10209,11315*,11382

- CANCER (Contd.)
  - diagnosis (Contd.)
    - radiology: 1303,4090*,4436,5848*,6080,6191,6242,6389,6391,6392,6866,7055,7056,7058,7427,7428,8193,8360*,8435,9068*,9089*,9291*,9348,9454*,9485*,9936*,10128,10232,10233,10450*
      - angiography: 5869,6390,9456*,10596*,11632
      - lymphography: 9359,11628
  - epidemiology: 266*,381,1326*,1331*,1412*,2147*,2181,2190,2231*,2274*,2282*,2324,2330,2473*,3088*,3177*,3184*,3907*,3911*,4020,4244*,4245*,4385*,4438,5001,5017*,5018*,5084,5256,5370*,6048*,6082,6089,6108*,6241,6289,7023,7024,7025,8042*,8182*,8187,8196,8514,8680,9075*,9076*,9078*,9096,9352,9357,10034,10035,10127,10225,10226,10227,10447*,10770,11220*,11314*,11316*,11541*,11543*,11545*,11623,11753*
  - etiology: 3908*,3915*,4320,6243,7069,9057*,9305*,9355,9356,9368,10193,10256,10365,10466,11220*,11333*,11369,11387,11445*
  - experimental studies: 722*,1333*,2062,2063,2164,2177,2178,2179,2180,2698,2700,3182*,3214,3276*,3373,3444*,3483,3485,3486,3714,4051*,4057*,4455*,4462*,4475,5354*,5360*,5403,5404,5407,6653,7430,8060,8201,8390,8480*,8513,8515,9307*,9435*,9437*,9507,9918,10164*,10257,10671,10672,10673,10675,10765,10770,10771,10775,10776,10777,10778,10779,10780,10781,10783,10784,10784,10785,10803*,11117,11333*,11386,11452*,11544*,11830,11865,11867
  - generalized: 4083,4303,5955,6348,6388,6391,6392,6393,6394,6955,6974,7061,7155,7251,8061,8178*,8195,8632*9078*,9108,9303*,9305*,9359,9374*,9435*,9436*,9437*,9454*,9456*,9506,9668*,9683*,9993*,10146*,10147*,10449*,10496,10498,10596*,10607*,10730,11283*,11541*,11622,11627,11628,11629,11632,11636,11644*,11748*,11751*
  - immunology: 400*,8035*,8171*,8279*,8480*,8962,9111,9450*,9502,10248,10249,10671,10784
  - metabolism: 11145,11828
  - pathology: 10365,10507
  - treatment: 1517,2261,2263,2703,3169,3372,6238,6240,7041*,7420,8033*,8358*,8387,8391,8414*,8515,8922,8970,9506,10177,10238,10502,10505,11293,11373,11380,11623
    - chemotherapy: 712*,1496*,3370,3373,3510*,3695*,3697*,4476,4478,4964,5082,5351*,5470*,5471*,5636*,5880,6049*,6087,6239,6388,8923,9078*,9107,9163,9304*,9353,9436*,9921,9975,10243,10669,10785,11202,11313*,11523*,11545*,11624,11634
    - radiation: 597*,1281*,1309,1496*,2086,2258,2326,3962,4025,4077,4084,4304,4306,4307,4372,5003,6239,6249,6865,7430,7530,8133,8134,9179,9358,9993*,10123,10124,11625,11636
    - surgery: 673*,1305,1308,1310,1520,1523,1578,2257,2264,2318,2321,2322,2356,2357,2359,2470*,2478*,2486,2529,2695,3100,3232*,3370,3371,3482,3487,3962,3994*,4009,4011,4015,4022,4024,4025,4059*,4082,4088,4091,4302,4304,4305,

CANCER, treatment, surgery (Contd.): 4981, 5014,5074,5075,5077,5082,5248*,5249*, 5257,5994*,6021,6023,6024,6056,6067,6068, 6069,6070,6071,6072,6073,6074,6075,6086, 6087,6089,6225*,6292*,6293*,6294*,6345*, 6393,7022,7065,7072,7079,7249,7431,8124*, 8125*,8130,8131,8132,8180*,8182*,8183*, 8185*,8189,8194,9198,8247*,8277*,8355*, 8357*,8359*,8361*,8387,8388,8389,8414*, 8678,8971,9014*,9024*,9033,9078*,9081*, 9085*,9303*,9305*,9350,9489*,9490*,9501, 9683*,9719*,9993*,10033,10093*,10124, 10125,10126,10141*,10143*,10146*,10147*, 10148*,10151*,10166*,10239,10241,10242, 10243,10326,10436*,10437*,10442*,10444*, 10445*,10447*,10498,10501,10559,11281*, 11295,11326*,11369,11374,11376,11378,11379, 11541*,11626,11630,11631,11639
CARCINOGENESIS (see also specific organ): 5024*, 10776
CARCINOID SYNDROME; CARCINOIDS (see also Serotonin): 316,418*,508,610,1388,2187, 2394,2399,2515,2696,4942,5131,5953,6037*, 6965,8247*,8970,9165,10031,10332,11370
CARDIOSPASM (see Achalasia)
CARDIOVASCULAR SYSTEM (see circulation under individual organs and Portal Hypertension)
CATHARTICS (see Laxatives)
CECUM (see also Intestine, Large): 133*,648, 1499*,1901*,2370*,2409,2483,2498,2512,3341, 3875,4248*,4254,4255,4256,4273,4279,5112,5270, 5632*,5646,7150,7245,7282,7871*,7919,8366, 9141*,9167,9290*,9308*,9319,9336,9736*,9839*, 10258*,10288,10316,10433*,10434*,10438*, 10464,10503,11412,11542*,11579*
CELIAC DISEASE (see Malabsorption)
CENTRAL NERVOUS SYSTEM (see also nervous control under individual organs; Neuroendocrine Control): 263*,318,1089*,1172,1212*,1429, 1433,1622*,2001*,2637*,5523,5707*,6147*, 6336*,6593*,6776*,7813*,7903*,7911*
CHILDREN (see under individual organs and diseases)
CHOLANGIOGRAPHY (see under Biliary Tract)
CHOLE- (words beginning with: see below and under Gallbladder; Biliary Tract; Bile)
CHOLECYSTECTOMY (see Gallbladder, surgery): 3799*
CHOLECYSTITIS: 913*,916*,918*,921*,926,933,937, 941,966,973,974,1593,1655,1656,1659,1816* 1818*,1825*,1830*,1841,1842,1846,1848,1854, 2230*,2566,2567,2622*,2799*,2811,3258,3265, 3599*,3973,4583*,4587*,4588*,4623,5217*, 5574*,5580,5588,5589,5989*,6596*,6605,6606, 6607,6608,6622,6626,6631,6684*,7397*,7587*, 7635*,7636*,7638*,7695,7699,8166*,8185*, 8475*,8521,8628*,8630*,8635*,8636*,8655, 8656,8657,8668,8952*,9062*,9069*,9145*, 9450*,9459*,9497*,9602*,9668*,9676*,9677*, 9678*,9681*,9702,9703,9707,9709,9710, 10266*,10618*,11013*,11674*,11684,11719*, 11826,11952*,11967,11969,11970,11971,11972
  children: 5587
CHOLECYSTOGRAPHY (see Gallbladder, diagnosis)
CHOLELITHIASIS: 790,919*,920*,939,941,942, 947,971,972,977,1343,1392,1412*,1644,1823*, 1828*,1832*,1838,1864,2566,2567,2622*,
CHOLELITHIASIS (Contd.): 2800*,2801*,2803*, 2822,3187*,3544*,3596*,3597*,3601*,3604, 3606,3610,3611,3618,3626,3628,3637,3638, 4286,4588*,4607,4615,4619,4621,4622,5217*, 5349*,5569*,5577*,5578*,5580,5581,5582,5583, 5584,5585,5586,5627,6293*,6325*,6491*,6588*, 6592*,6594*,6596*,6602*,6604,7032*,7636*, 7638*,7646*,7673,7677,7678,7691,7888*,8050, 8166*,8240*,8285*,8473*,8640,8687,8688,9136, 9459*,9464*,9485*,9497*,9602*,9677*,9679*, 9681*,9701,9702,10309,10607*,11013*,11671*, 11674*,11720*,11736*,11740*,11749*,11948*, 11950*,11975,11977,11978,11981,12010
  aging: 7674,9690
  associated diseases: 10573,11951*,11974
  children: 5587,6612
  diagnosis: 7153,7324,8636*,9678*,11737*, 11973,11980
    biopsy: 11974
    radiology: 8663
  epidemiology: 8042*,11951*
  etiology: 3594*,3595*,7675,8634*,8637*, 9680*,11949*,11957*,11976,11979
  pathology: 11980
  surgery: 6630,7674,7676,8628*,8643,8657, 9069*,9408*,9670*,11973
CHOLERA: 259*,261*,1160,1161,2142*,3071,3083*, 3934,3945,3946,4848,4902,4903,5854,5913, 6163*,6917*,6953,7702,8006,8103,8246*,8918, 8954*,9006,9007,9008,10009*,10010*,10064, 10065,10066,10067,10068,11185,11218*,11219*, 11258,11259
  children: 4835*
CHOLESTASIS: 839,917*,949,958,1649,1734*,1742*, 1820*,1861,1862,2710,2711,2712,2713,2714, 2715,2716,2749,3417*,3433*,3465,3506*,4392* 5565*,6326*,6364*,6418,6427,6434,6452,6479, 6587*,6601*,6767*,7375*,7383*,7385*,7394*, 7640*,7653,8478*,8479*,8630*,8631*,8686, 9462*,9463*,9492*,9563,9564,9583,9589,9665*, 9696,10594*,10612*,10688,10795*,10800*, 10830*,11705*,11732*,11735*,11740*,11777
CHOLESTEROL (see Absorption; Liver, metabolism, cholesterol and steroid): 1830*,2800*, 4746
CIRRHOSIS (see also Abdomen, ascites; Esophageal Varices; Liver, alcohol; Liver, coma; Portal Hypertension): 1675,2610*,2793, 3499*,6379,6427,6428,6437,6450,6451,6452, 6453,7356*,7410,7631,7789*,8039*,8468*, 8470*,8479*,8481*,8497,8615*,9448*,9450*, 9493*,9533,9670*,9676*,10566*,10843*,10846, 11013*,11025*,11744*,11749*,11931*,11940
  alcohol: 2782*,2787*,2796,3915*,4555*, 4564,4566,4578,6335*,6414,6565*,6570*, 6579,7501*,7502*,7614*,7853*,7989*,8473*, 8619*,9434*,9451*,9469*,9473*,9500*, 9597*,9647*,9649*,9653*,10089*,10406*, 10596*,10602*,10828*,10829*,10831*, 10835*,10836*,10837*,10840*,10844*,10991*, 11731*,11932*,11935*
  anemia: 901,902,903,1803*,1944*,5423, 5551*,9655
  ascites: 726*,1810,3576*,3579*,3588,4545*, 4546*,4551*,4558,4559,4567,4573,4574, 4575,4579,4581,5554*,6566*,6573,6583,

- CIRRHOSIS, ascites (Contd.): 7504*,7608*,7620*,7621*,8616*,8619*,9485*,9635*,9637*,9639*,9651*,9652*,10114,10594*,10603*,10604*,10625*,10827*,10828*,10829*,10834*,10835*,10837*,10838*,10840*,10841*,10847,10851,11926*,11928*,11944,11946
  - associated diseases: 796,889,1802*,1804*,1809,1812,1814,1815,2791,3581*,4549*,4551*,4576,4580,6425,6435,6564*,6570*,6573,6581,7163*,7422,7613*,7624,8240*,8620*,8621,8625,9597*,9655,10731,10830*,10833*,10844*,10851,11216*,11753*,11886*,11932*,11938,11939,11943
  - biliary: 890,891,892,893,894,895,897,1807*,2622*,2798,3440*,3544*,3580*,4600,6325*,6331*,6575,7359*,7378*,7612*,7613*,7989*,8042*,8460*,8620*,8630*,9451*,9460*,9471*,9641*,9645*,9646*,9649*,10089*,10594*,10596*,10830*,10841*,11719*,11720*,11736*,11753*,11933*,11941,11946
  - blood coagulation: 6569*,7622*,8614*,9638*,10589*,10648
  - children: 1797*,1814,2797,3583,3589,4556*,4557*,5464*,6580,7630,9652*,11939,11945
  - circulation: 4550*,4554*,4563,4571,4572,4573,4574,4575,5547*,6567*,7382*,7610*,7620*,7621*
  - clinical studies: 1813,3421*,3578*,6577,10836*,11927*,11934*
  - diagnosis: 886,887,2633*,2654,2794,3440*,3443*,3544*,3559,3580*,3585,4396*,4545*,4546*,4559,4570,4600,5349*,5369*,5381*,5382*,5561,5562,6329*,6331*,6578,7371*,7373*,7387*,7394*,7447,7572*,7618*,7621*,7622*,8170*,8460*,8624,9447*,9471*,9485*,9492*,9500*,9637*,9643*,10406*,10624*,10647,10830*,10842*,11945,11946
    - biochemical procedures: 7619*,8522,9264*,9459*,9460*,9462*,9636*,9639*,9640*,9647*,9657,10089*,10606*,10607*,10721,10731,10831*,10832*,10839*,10847,10848,10849,10851,11158*,11722*,11723*,11731*,11733*,11735*,11746*,11748*,11927*,11937
    - biopsy: 6324*
    - radiology: 6429,10596*
  - epidemiology: 2789,4547*,4556*,6570*,6574,7633,11753*
  - etiology: 808*,897,906,1743*,1799*,1802*,1808*,3581*,4461*,4500*,4553*,4562,5363*,5464*,5564,6470*,6570*,7633,9644*,9658,9660,10743*,10845*,10853
  - experimental studies: 1794*,1796*,1801*,4553*,4600,5564,7609*,8565,8617*,9574*,9649*,9650*,9651*,9659,10991*,11705*,11859*,11935*,11936*
  - hormonal control: 6562*,6563*
  - immunology: 726*,882*,886,894,896,908,1793*,1806*,2781*,3553*,3573*,3574*,3580*,4368*,4514,4577,4578,5365*,5548*,5557,7617*,7618*,8618*,9451*,9452*,9661,10521*,10739*,10849,11729*,11929*,11930*,11933*
- CIRRHOSIS (Contd.)
  - metabolic changes: 847,884*,899,900,901,902,903,904,905,1795*,1796*,1798*,1800*,2784*,2786*,2794,3426*,3553*,3573*,3574*,3575*,3582,3584,3587,3590,4541*,4542*,4548*,4555*,4560,4563,4630*,4737*,5230,5423,5544*,5788*,6333*,6465*,6562*,6563*,6564*,6565*,6566*,6568*,6571*,6572*,6584,6585,7395*,7397*,7607*,7615*,7616*,7748*,7989*,8623,9499*,9650*,9654,10590*,10844*,10991,11722,11723,11926,11928
  - microorganisms: 7377*
  - pathology: 713*,724*,881*,883*,888,897,898,907,1805*,1811,2647,2778*,2779*,2780*,2782*,2784*,2785*,2787*,2788,2790,2792,2795,3438*,3465,3480,3533,3589,4391*,4547*,4550*,4551*,4556*,4557*,4566,4568,4569,4576,4579,5363*,5369*,5545*,5546*,5547*,5550*,5553*,5555*,5556,5557,5560,6324*,6328*,6366*,6567*,6569*,6570*,6572*,6587*,7371*,7528*,7609*,7611*,7619*,7622*,7632,8622,9472*,9483*,9491*,9596*,9642*,9646*,9649*,9655,9658,9660,10588*,10612*,10833*,10835*,10840*,10845*,10850,11859*,11925*,11944
  - treatment: 885*,892,893,1630*,1774,1795*,1800*,1806*,1810,2462,2780*,2783*,2784*,3413*,3576*,3579*,3583,3586,3588,4551*,4552*,4558,4560,4564,4565,4567,4581,5411,5549*,5558,5559,6201*,6368*,6576,6581,6582,6583,6848*,7497,7608*,7612*,7614*,7617*,7628,7629,7634,8619*,8626,8627,9495*9517,9651*,9653*,9656,10594*,10625*,10657,10834*,10835*,10837*,10838*,10842*,10852,11743*,11850*,11934*,11944,11945,11947
  - water and electrolyte metabolism: 2779*,4552*,4559,4564,4571,4572,4573,4574,4575,5549*,5553*,5556,5563,6335*,6568*,6569*,7614*,7626,7627,8616*,8626,10834*,10836*,10837*,10841*,10844*,11942
- COLITIS (see also Enteritis; Enterocolitis; Gastroenteritis): 283,1201,1531,1532,2150*,3233*,3922,5242*,5855,5899,6522,7278,7281,7291*,8040*,8375,8376,8399*,9237,9293*,9309,9310,9311,9323,9658,10450,10451,11564,11565,11568,11642*,11645*,11749*
- COLITIS, GRANULOMATOUS (see Enteritis, Regional)
- COLITIS, ULCERATIVE (see Ulcerative Colitis)
- COLON (see Intestine, Large)
- CONSTIPATION: 230,275,344,1071*,1156*,1203,1206,1208,1529,2110,2129,3375,3715,3877,3984,3985,4865,7165*,7891*,9302*,9341,11174,11256,11519*,11598,11619,11660
- CORTICOSTEROIDS: 74*,170,213,320,356,445,476,477,666,769,892,1040*,1059,1118,1139,1141,1150,1152,1435,1436,1453,1549*,1585*,1647,1755*,1756*,1763*,1779,1784,1846,1900*,1927*,2033*,2073,2096,2275*,2429,2438*,2533*,2634*,2636*,2890*,2916*,2929*,2952*,3009,3082*,3444*,3542*,3551*,3552*,3567,3646*,3836,3697*,3700*,3792*,3967,4137,4160,4162*,4205,4317,4646,4682*,4698*,4716*,4722*,4728*,4772,4796,4868,5156*,5159*,5160*,5183,5184,5185,5193*,5195*,5271,5291*,5295*,5301*,5363*,5507*,5665*,5666*,5754,5784*,5809,5818,5834,

ORTICOSTEROIDS (Contd.): 5835,5836,6104,6158*,6195*,6204*,6282*,6452,6453,6461*,6463*,6495*,6496*,6583,6666*,6680*,6706*,6802,6805,6911*,7122*,7162*,7170*,7206*,7348.7393*,7557*,7558*,7560*,7561*,7570*,7582*,7613*,7614*,7690,7760*,7806*,7833*,7864,7934*,7941*,7956,7964,8000,8214,8297*,8304*,8311,8335*,8393,8478*,8587*,8588*,8700,8723*,8839,8845,8949*,8965,9107,9225,9232,9366*,9423,9441*,9443*,9493*,9578*,9579,9632,9635*,9653*,9788*,9831*,9897,10430*,10571*,10592*,10594*,10745,10797*,10801*,10833*,10919*,10955*,11044*,11103*,11141,11451*,11455*,11495,11646*,11798,11879*,11880*,11885*,11886*,11913,11914,11916,11926,11934*,11959
ROHN'S DISEASE (see Enteritis, Regional)
YSTIC FIBROSIS (see Mucoviscidosis)

EFECATION: 2494,3357,4250*,5239*,7165*,7892*,9974,11071*
IAGNOSTIC PROCEDURES (see under Gastrointestinal Tract, diagnosis; specific organs and diseases)
IAPHRAGM (see also Hernia, diaphragmatic): 3861
  rupture: 1302,1311,1313,1321,4044
IARRHEA: 207*,226,232,233,260,281,289,294,318,330,1071*,1166,1174,1176,1177,1217*,1219*,1246,1481*,1488,1905*,2103*,2132,2146*,2191,2192,2197,2200,3045,3056,3074*,3075*,3076*,3081*,3105,3106,3257,3885,3886,3903,3920*,3934,3937,3938,3939,3940,3941,3942,4233,4237,4850,4882*,4898,5029*,5209*,5217*,5244*,5841*,5850,5851,5882*,5885*,5886*,5895,5906,5909,5910,5954,6163*,6193,6201*,6218,6854,6884,6889,6910*,6911*,6917,6948,6949,6952,7124*,7156,7165*,7886*,7891*,8008,8009,8010,8095,8115,8127*,8244*,8246*,8287*,8292*,8329*,8336*,8906*,8940,8947*,8949*,8953*,8954*,8958,9010,9080*,9087*,9204*,9248*,9257*,9262*,9271,9276,9298*,9302*,9365*,9381*,9752*,9971,9974,9997*,10050,10052,10053,10153*,10260*,10262*,10267*,10392*,10394*,10399*,10401*,10403*,10408*,10436*,10443*,10519*,11013*,11025*,11177,11178,11179,11180,11215*,11404*,11405*,11514*,11519*,11542*,11640*,11700*,11928*,11946
  children: 2193,2198,3234*,4849,4896,4897
ETOTHERAPY (see under Nutrition)
GESTION (see also Bile; Intestine, Small; Pancreas): 115*,983,1202,1988*,2354,2377*,2946*,3763*,4749,4750,5002,5023*,5856,6888,7776*,7873*,8917,9277,9735,9835,9837,11026*,11046*
  carbohydrate: 112*,1060*,1061*,1063,2010,3767,5759*,5760*,5857,6676*,6677*,6705*,7857,7875*,9831*,10324
  children: 1060*,1061*
  lipid: 114*,2007*,6641,6738*,6741,7312*,7313*,11714
  protein: 2009*,2013,2014,2015,2948*,3764*,3765,3767,5698*,5732*,5761*,5762*,6705*,6727,6735*,6736*,7748*,7879,9832*
VERTICULA (see under specific organs)
VERTICULITIS (see under specific organs; Malabsorption)
DUMPING SYNDROME (see Gastrectomy, complications, dumping syndrome)
DUODENUM (see also Intestine, Small): 2*,16,419*,437,472,482*,484*,496,518*,551,553,980*,1003*,1013*,1072*,1075*,1188,1259,1396,1405,1407,1418*,1452,1816*,1864,1901*,1908*,1939,1979*,1991*,2009*,2334,2340*,2391*,2393*,2395*,2396*,2402*,2407*,2410,2411,2413*,2414*,2579,2602,2817,2825,2837*,2903*,2913*,2927*,3051,3082*,3090,3237*,3238*,3243,3251,3254,3267,3268,3274*,3275*,3277*,3286,3287,3288,3290,3292,3293,3300,3302,3392*,3663*,3664*,3671*,3697*,3719*,3731*,3733*,3949,4069,4124*,4137,4146,4156,4157,4211*,4342,4358*,4374*,4599,4631*,4672*,4737*,4753*,4754*,4841*,4940,5124,5149*,5150*,5324,5662*,5759*,5777*,5778*,5848*,6111*,6121,6126,6130,6134,6135,6136,6141,6151*,6161*,6303,6579,6638,6643*,6645*,6756,6852,6864,6912*,6992,7083,7117*,7127,7148,7203,7335*,7670,7736,7744*,7858,8058,8170*,8178*,8247*,8253,8259,8263,8265,8266,8268,8271,8272,8275,8282*,8290*,8299*,8313,8328,8332*,8335*,8425,8426,8427,8458,8650,8651,8678,8730,8807*,8937,8944,9072*,9132,9137,9143*,9145*,9147*,9153,9169,9174,9175,9181,9185,9189,9212*,9256*,9260*,9309,9371,9388,9667*,9674*,9714,9715,9739,9743*,9745*,9791*,9831*,9839*,9950,10041,10140,10181,10198,10214,10263*,10266*,10276,10293,10295,10297,10306,10314,10323,10329,10330,10382,10416,10546,10937*,10940,10980*,11081,11208,11209,11210,11211,11334*,11358,11417,11419,11420,11422,11424,11432,11435,11460,11466,11496,11499,11674*11971,11994
  diseases (see also under ulcer): 313,448,492,493,500,521*,535,679,683,1348
  diverticula: 491
  morphology: 27*,32*
  secretion: 115*
DYSENTERY (see also Amebiasis; Shigellosis; Typhoid Fever): 291,1253,1254,1255,2109,2131,2194,3038*,3062,3085*,3454,3925,4851,4852,4900,4901,5242*,5430,5852,5903,5912,6946,6950,8096,8100,8101,8246*,9001,9209*,9711,11540*
  children: 8005,8097,11164*,11254
  diagnosis: 1190,3890,3891,8005
    biochemical procedures: 6951
  epidemiology: 288,11189
  immunology: 8102
  treatment: 210*,251,1190,3061,3888,3889,3892,4899,5911,6877,6886,6892,8004,8098,9962,9963,10058,11164*,11186,11190,11191

EMBRYOLOGY (see development under specific organ and Gastrointestinal Tract)
EMESIS (see Vomiting)
ENDOSCOPY (see diagnosis under specific organ)
ENTERITIS (see also Colitis; Enterocolitis; Gastroenteritis): 272*,282,286,641,2199,2201,3240,3242,3887,3939,4126*,4854,5222,5659*,6119*,6193,6878,6890,7206*,8002,8943,8947*,10007*,10051
ENTERITIS, REGIONAL: 509,571,572,1388*,1466*,1467*,1468,1469,1470,2437*,2438*,2439*,2441,2442,2443*,2537*,2541*,3074*,3305,3306,3307,

ENTERITIS, REGIONAL (Contd.): 3308,3309,3982,4207*,4208*,4209*,4210*,4211*,4214*,4215*,4216*,4243*,4312*,5192*,5196,5198,5304,6114*,6198,6199,6201*,6846*,7199*,7200*,7201,7202,7203,7289*,7290*,7295,8213,8239*,9249,9250,9251,9252,9255,10391*,10392*,10393*,10394*,10395,10396,10397,10430*,11065*,11510*,11512
  Crohn's Disease of colon (granulomatous colitis): 570,1560,1562,2440,3304*,3310,3379*,3380*,4212,4213,4311*,4321,4322,5193*,5194*,5195*,5197,5234*,5240*,5295*,6195*,6196,6197,7900*,9247*,9248*,9253,9254,9372,10394*,10408*,10430*,10523,11509*,11510*,11511*
ENTEROCOLITIS (see also Colitis; Gastroenteritis): 283,292,591,2151*,2195,2461,3072,3944,4857,4858,4860,5287,6522,6594*,7237*,8031*,8185*,9012,10049,11162*
  children: 3932,3935,3943,4893,11254
  Escherichia coli: 1246,1249,1250,3944,4859,4894,4895,5842*,5843*,5850,5882*,6838*,6890,6947,6950,6958,9965,9991*,11226*
  etiology: 10054,10262*
  necroticans: 1377*,1390,2363*,2364*,2365*,2366*,3241,3242,6140,10262*
  pathology: 10440*
  pseudomembranous: 296, 2196
  staphylococcal: 1247,3104,5914,5916
  treatment: 1394,1532,3103,3922,5843*,5855,6890,9965,9969,11540*,11553,11554,11563,11660
  tuberculosis: 11542*
ENZYMES, MISCELLANEOUS (see also Amylase; Liver, enzymes, parenchymal; Pancreas, secretion; Phosphatase; Stomach, secretion, pepsin): 6*,15*,488*,490,580*,717*,1013*,1082*,1141,1202,1332*,1381*,1479*,1801*,1975*,2325,2935*,3641*,5200*,5776*,5849*,5933,5966,6100,6187,6273,6476,6529,6532,6539,6543,6544,6739,6935,6950,7059,7137,7222,7536,7723*,7731,7764*,7793,7838*,7842*,7857,7867,7871*,7874*,7880,7967,7987*,8031*,8044,8045,8238*,8354*,8523,8555,8765*,8789,8800,8813*,9074*,9079*,9177,9371,9729,9813*,9836,9892,10074,10259*,10260*,10299,10401*,10531,10609*,10611*,10794*,10807,10928,10930,10933,10934,10953*,10955*,10969*,10984*,10990*,10991*,11022*,11040*,11321*,11415,11523*,11933*
ESOPHAGITIS: 348*,349*,353*,357,386,1280*,1284*,1301,2271,2272,2354,3149,4001*,4014,4047,5988,5997*,6849,6977,6993*,7026,8116*,8121*,8122*,8127*,8327,9019*,9026,9027,9028,9029,11279*,11284*,11311,11640*
ESOPHAGUS (see also under Achalasia; Hernia): 2350,2351
  aging: 9766*,10097*,10110,10111,10112,11310
  anomalies: 368,369,1298,1313,1315,1319,1320,2227*,2252,2253,3137*,3152,3996*,4027,4028,4029,4030,4043,5016,7003,7004,7005,7010,8123*,8138,8150,8151,8152,8153,8380,9038,9039,9040,9042,10099,11290
  associated diseases: 350*,1280*,3138*,4000*,4001*,4048,5005,5006,5926,5988*,6017,7050*,9014*,9015*,11282*

ESOPHAGUS (Contd.)
  carcinogenesis: 1286*,2177,5000
  children: 358,361,366,372,392,1284*,1300,1321,2227*,2246,2255,3153,3997*,3999*,4038,4046,4971*,6000,6017,6646*,7008,7014,8138,8148,8158,8163,10101,10102,10119,10622*,11280*,11301,11309
  circulation: 2849*,4984,5996*,6646*,6998*
  clinical studies: 9017*,9025*
  development: 372,10108
  diagnosis: 351*,374,380,1280*,3149,3851*,3995*,4996,6013,6028,8162,8170*,9020*,10097*,10109,10122
    biochemical procedures: 6999*,9026,10089*,11296
    biopsy: 4023,5042,9015*,9766*,10097,11213
    endoscopy: 1288*,1289,1306,1312,2254,2255,3151,4042,4995,4999,5874,5988*,6015,6051*,9016*,10089*,10116,10117,10208,11213,11279*,11280*,11283*,11287,11640*
    manometry: 1294,3136*,3990*,3995*,4041,4047,5987*,8117*,8118*,8119*,10098*,11279*
    radiology: 345*,395,1087*,1282*,1303,2234*,2256,3136*,3141*,3157,3158,4005,4007,4034,4035,4995,4997,4998,5987*,5988*,5990*,5991*,5993*,5995*,5999,6010,6019,6579,8118*,8119*,8121*,8129,8149,8158,9019*,9029,10089*,10097*,10098*,10099,10107,10115,10215,11280*,11282*,11283*,11288,11289,11640*
  diseases: 362,375,3150,4033,4040,4985,4986,6849,7050*,8001,8138,8162,8947*,9022*,9023*,9030,9031,9035,10098*,10103,10106,10108,10110,10111,10140,10178,10215,11282*,11283*,11286,11294
  diverticula: 360,2250,2251,3154,4031,4977*,4993,4994,6002
  dysphagia: 3143*,3144*,3990*,4033,8122*,8124*,9019*,9020*,9037,9766*,10093*,10098*,11282*,11640*
  fistula: 369,2250,3152,3153,4026,4029,4039,5014,5015,5016,7005,7009,7010,9014*,10094*,11290
  foreign bodies: 361,2273,3147,4987,8163,8967,10021,10022,10109
  Mallory-Weiss Syndrome: 364,365,2143*,3139*,4974*,8170*,10566*,11291
  microorganisms: 4990,4991,10107,10111
  morphology: 35,353*,372,1006,1928*,1937,2848*,2856*,3993*,4034,4971*,4984,5988*,5997*,6014,6577,6646*,7740,10070,10091*
  motility: 10*,357,362,363,364,367,1085*,1087*,1289,1294,2227*,2958*,2960*,3135*,3140*,3144*,3780*,3783*,3990*,4035,4776,4971*,5013,5987*,5989*,6002,6051*,6994*,6999*,7000*,7899*,8118*,9021*,9022*,9023*,10090*,10098*,10106,10121,11079,11285*,11288
    pressure studies: 1279*,3136*,3995*,4002*,5991*,7913,7914,8117*,9850*,11279*,11441*

ESOPHAGUS (Contd.)
mucosa: 5995*,6017,7000*,7164*,8120*,8135,9015*,10103
neoplasms: 1304,2261,3169
benign: 4021,8128,8129,11283*,11292
malignant: 376,377,378,379,380,381,382,383,384,385,388,455,1281*,1285*,1303,1305,1306,1307,1308,1309,1310,1312,2102*,2231*,2241,2257,2259,2260,2262,2263,2264,2265,3145*,3168,3170,3993*,3994*,4009,4011,4015,4020,4022,4023,4024,4025,4026,4981,4982,5001,5002,5003,5004,5014,5994*,6018,6019,6020,6021,6022,6023,6024,6026,6995*,7001*,7022,7023,7024,7025,8035*,8124*,8125*,8132,8133,8134,8971,9024*,9033,9995*,10093*,10100,10123,10124,10125,10126,10127,10128,10129,10147*,10241,11220*,11281*,11283*,11293,11295
nervous control: 1087*,2227*,2958*,5997*,11308
obstruction: 1283*,1318,2232*,2234*,2252,2259,2268,2269,3142*,3996*,4010,4032,4988,4995,5999,6001,6033*,6034*,7015,7215*,8121*,8148,8155,10090*,10102,10104,10105,11297,11298,11300
pathology: 10098*
perforation: 370,1295,2270,3137*,4036,4037,4038,7019,7020,7021,8122*,8146,8147,8148,10100,10101,10631*
polyps: 336,1322,4950
prosthesis: 358,366,1299,1305,1308,1316,1317,2232*,2257,2264,2265,2266,2267,3142*,3143*,3148,3150,3997*,4004,4005,4007,4008,4009,4010,4011,4012,4014,4015,4016,4017,4018,4019,4022,4976*,4978,4979,4980,4981,4982,4983,6004,6005,6006,6007,6008,6010,6011,7002*,7011,7012,7014,7015,7215*,8121*,8126*,8132,8154,8155,8156,8157,8160,8164,9014*,9017*,9033,9034,9986,10086,10093*,10096*,10102,11281*,11296,11297,11299
reflux: 349*,350*,435,1284*,1301,2222,3135*,3138*,3146,3155,3167,3174*,3996*,3999*,4001*,4972*,4973*,5012,5013,5989*,5994*,5997*,6646*,6993*,6994*,6999*,7026,7032*,8116*,8117*,8119*,8121*,8122*,8140,9019*,9020*,9028,9766*,10091*,10095*,10112,10113,11279*,11311
stricture: 354,355,356
surgery: 346*,347*,355,369,371,373,380,384,385,388,393,455,1301*,1314*,1315*,1318*,1319*,1320*,2102*,2227*,2237,2240,2243,2257,2260,2262,2269,2270,3150,3155,3156,3159,3161,3162,3164,3170,3990*,3991*,3996*,3999*,4003*,4004,4006,4013,4025,4030,4033,4043,4047,4048,4049,4837*,4972*,4973*,4975*,4976*,4987,4992,5008,5011,5987*,5994*,5998,6000,6001,6003,6009,6016,6017,6020,6027,6079,6994*,6996*,7005,7009,7010,7011,7012,7013,7992*,8116*,8119*,8121*,8122*,8123*,8124*,8130,8135,8137,8138,8139,8147,8150,8151,8153,8160,9014*,9017*,9018*,9019*,9025*,9027,9028,9038,9040,9046,9090*,9517,9986,10094*,10095*,10098*,10101,10118,10124,10125,10138,10241,11280*,11285*,11295,11298,11306,11307

ESOPHAGUS (Contd.)
toxic effects
chemical: 10137,11301
trauma: 2250,4989,6001,6012,7008,8138,10137,11301
ulcer: 348*,1447,3166,9019*,11279*,11284*,11640*
varices: 715*,718*,721*,797,885*,907,1287*,1795*,1807*,2143*,2228*,2247,2248,2249,4551*,4554*,4975*,5545*,5547*,5551*,5996*,6000,6017,6351*,6373*,6998*,7410,7608*,7621*,7985*,8620*,9016*,9036,9517,9641*,9936*,10089*,10114,10115,10622*,10624*,10625*,10627*,10828*,11289,11322*,11743*

FAT (see Absorption, lipid; Digestion; Lipids; Liver, metabolism lipid; Malabsorption)
FECES: 114*,264*,265*,573*,863*,983,1156*,1195,2370*,2500,2836*,3035*,3129,3600*,3693*,3902,4629*,4853,4869,4871,4959,5226,5633*,5694,5850,6119*,6661*,6662*,6848*,6879,7124*,7318*,7564*,7751*,7776*,7979,7997,7998,8031*,8051,8052,8375,8413*,8903*,9722*,9724*,9802*,9963,9967,10408*,10446*,10594*,10957*,10981*,11087*,11174,11176,11187,11188,11197,11425,11426,11543*,11546*,11676*
FISTULA (see under individual organs)

GALLBLADDER (see also Biliary Tract; Cholecystitis; Cholelithiasis): 11170
absorption: 6648*,6690,8719*
aging: 1836*,5623,5647*,11967
anomalies: 1898,3620,4606,4608,5620,5621,6597*,7696,8684,11955*,12011,12012
associated diseases: 796,1780,4417,5187,5228,7641*,9711,11966
biochemistry, chemical composition: 8771*
children: 1818*,2825,3602*,7703,9702
cholecystokinin (see also Pancreas, pancreozymin): 98*,121*,125*,2897*,2918*,2963,3736*,3770*,3788,4718*,4753*,4765*,4771,5706*,5722*,5793*,6684*,6743*,7893*,7902*,9684*,9726,9808*,9840*,9851*,10570*,11013*,11031*,11032*,11080,11670*
circulation: 7635*,7645*
clinical studies: 7681,11995
development: 11955*
diagnosis: 1855,3041,3619,5598,5613,5614,6617,9710
biopsy: 6684*,7685
cholecystography: 121*,961,1816*,1819*.1822*,1833*,1869,1877,1878,1879
radiology: 1180,1184,1186,1187,1189,2825,2963,3621,4515,5568*,5576*,5596,5598,5599,5722*,6593*,6597*,6599*,7644*,7645*,7873*,8645,8664,8687,9554,9681*,9682*,9684*,9687,9699,9703,10573,11953*,11961,11991,11992,11993,11995,11996,11997,11998
angiography: 3612,3617,11208
lymphography: 3597*

GALLBLADDER (Contd.)

- diseases: 925,944,955,2807*,3601*,3602*,4940,5570*,5604,5607,5608,5610,5611,5615,5624,6597*,7700,7702,7703,8166*,8644,8645,8646,8647,8664,8675,8947*,9061*,9670*,9682*,9685*,9687,9695,9703,9704,9708,9712,10000*,10639,11047*,11967,11968,12010
- diverticula: 3635
- epidemiology: 1836*,7694
- fistula: 9069*,9691,9997*
- hormonal control: 7690
- microorganisms: 3610,7698
- morphology: 5647*
- motility: 1090,1819*,1850,1851,5640,6684*,6713*,6776*,7641*,7701,7873*,7884*,7893*,7902*,8674,9840*,11080,11961,11966
  - pressure studies: 5576*
- mucosa: 1827*,6684*,8719*,12011
- neoplasms
  - benign: 1877,4603,7639*,7679,7680,8638*
  - malignant: 942,3616,3621,3628,6717,7636*,7681,7682,7683,7684,7685,7686,8042*,8677,8680,9464*,9683*,11220*
- nervous control: 6776*
- obstruction: 1822*,7647*,11955*
- pathology: 3637,7635*,9703
- perforation: 925,2811,4602,7636*,7687,7699,8683,8719*
- polyps: 1837,6597*
- secretion: 8771*
- surgery: 171,933,1824*,1855,1899,2230*,2806*,2813,3492,3598*,3606,3610,3613,3614,3618,3628,3633,3810*,3983,4583*,4588*,4591,4604,4615,4620,4885,5217*,5228,5569*,5570*,5571*,5574*,5588,5591,5592,5623,5624,5625,5626,6294*,6572*,6588*,6592*,6593*,6597*,6599*,6617,6626,6631,6751*,7081,7635*,7636*,7637*,7638*,7639*,7671,7685,7688,7689,7690,7691,7692,7693,7694,7695,7696,7697,7789*,7888*,8285*,8291*,8419,8423,8464*,8636*,8638*,8644,8645,8646,8647,8653,8655,8656,9408*,9412*,9443*,9459*,9497*,9667*,9668*,9673*,9678*,9680*,9681*,9682*,9686*,9717,10736,11013*,11954*,11972,12008,12009,12010
- trauma: 6611

GAS: 17,228,517*,794,1265,3442*,3763*,4115,4961,5413,6268,6447,7032*,7388*,8066,8553,9080*,9158,9456*,9755*,9936*,9974,11283*,11401*,11669*,11811

GASTRECTOMY (see also Malabsorption; Ulcer, surgery; Stomach, neoplasms, malignant): 306,402*,420*,454,465,531,1341,2314,2424,2826,2913*,3197,3208,5025*,5049,6054,6056,6060,6063,6064,6065,6072,6074,6077,6078,6187,6357*,6751*,7076,7077,7078,7081,7084,7192,7193,7220,7835*,8130,8167,8180,8182,8189,8226,8228,8229,8235,8323,9071*,9084*,9085*,9109,9130,9136,9208*,9379*,9412*,10113,10143*,10148*,10151*,10166*,10191,10205,10223,10260*,10351,10352,10408*,10429,10580,10651,10853,11328*,11333*,11379,11394,11487,11671*

GASTRECTOMY (Contd.)

- associated diseases: 410*,1343
- clinical results: 414*,459,462,549,1353,2282*,2295*,2298*,2305,2307,2310,2356,2359,2432,4055*,4059*,4061*,4062*,4085,4088,4176,4192,5045,5059,5062,5064,5082,5155*,6043*,6055,6069,6070,6071,6073,6086,6089,6156*,6164*,6168*,6180,6181,7039*,7042*,7046*,7048*,7163*,7167*,8183*,8203,8222,8287*,8292*,9078*,9080*,9129,9131,9133,9135,9204*,9234,9241,10141*10146*,10147*,10152*,10217,10218,10224,10241,10340*,10341*,10353,11326*,11327*,11388,11392,11393,11440*,11442*,11485
- complications: 461,463,466,537,1333*,1335*,1351,1369,1370,1371,1428,2271,2283*,2295*,2304,2309,2311,2312,2380*,2837*,3174*,3181*,3196,3199,3211,4063*,4071,4096,4194,4413,4885,5007,5010,5044,5046,5047,5050,5051,5052,5053,5054,5055,5056,5057,5060,5117,5126,5148*,5152*,6042*,6043*,6045*,6061,6102,6167*,6310*,7026,7050*,7068,7079,7082,7085,7167*,7172*,7188,7267,7341*,8176*,8231,8232,8236,8277*,8280*,9231,9285,10104,10219,11391,11395,11679
  - afferent loop syndrome: 5063,7048*,8185*,8233,9082*,10283
  - anemia: 410*,586,4072,5029*,5048,5058,7172*,7219*,8185*,8222,8287*,8715*,8716*,8717*,9090*,9204*
  - bone disease: 399*,5030*,7080,9286,10141*
  - dumping syndrome: 398*,418*,452,460,1364,1327*,2277*,2278*,2291*,2292*,2315,3178*,3189*,3198,4073,5029*,6036*,6037*,6038*,6039*,7028*,7086,8127*,8185*,8222,8287*,8292*,9080*,9081*,9082*,9083*,9086*,9087*,9204*,9212*,10142*,10144*,10150*,10222,10401*,11326*,11468
  - malabsorption: 457,464,585,586,587,1016*,1330*,1472*,2288*,4118*,4235,5028*,5058,6044*,6846*,6848*,7043*,7175*,7205*,7212*,7216*,7219*,7891*,8287*,10141*,10398*,10401*,10405*,11519*,11531
  - metabolic changes: 78*,415*,416*,1340,1570,5027*,5028*,5039,5040,5041,6189,7028*,7043*,7175*,7205*,8227,8234,9086*,9134,10087,10142*,10144*,10149*,10218,10220,10221,10349,10350,10359,11390,11483,11519*,11706*
  - microorganisms: 434
  - recurrent ulcer: 453,458,2422,4192,5026*,5134*,5148*,8287*,8288*,8292*,8293*,8294*,8319,9204*,10153*,10340*,11493
  - treatment: 1327*,1364,4189,5029*,5043,5063,5065,6038*,6041*,6066,9080*,10222,11326*,11396
- technic: 397*,453,459,1335*,1359,1430,2283*,2289*,2294*,2306,2308,2313,2316,4060*,4074,4075,4112,5038,5045,5061,5155*,5877,6043*,7048*,7053*,7175*,7191,8183*,8285*,

STRECTOMY (Contd.)
- technic (Contd.): 8289*,8326,9132,9135,10145*,11325*,11354,11377,11485,12010

STRIN (see Stomach, gastrin)

STRITIS: 296,432,1398,2150,2929*,3078*,4054*,4198,4706*,7050*,7069,7101,7110,8002,8039*,8040*,8185*,8279*,9056*,9060*,9061*,9087*,9144*,9204*,9209*,9649*,9936*,10153*,10177,10190,10191,10278,10557,10566*,11047*,11318*,11322*,11326*,11360,11361,11365,11514*
- associated diseases: 423*,1365,2276*,6161*,6570*,7050*,9117,9709,10254,10371,10560,11317*,11366
- atrophic: 411*,1418*,2290*,2300*,3171*,3176*,3182*,4105,4706*,5031*,5033*,7034*,7035*,7047*,8760*,8761*,9050*,9053*,9054*,9057*,9071*,9719*,10161*,10165*,10196,11037*,11056*,11317*,11366
- children: 10160*
- diagnosis: 1324*,1348,1350,1366,4053*,4055*,4064,4086,7054*,8757*,9145*
  - biochemical procedures: 10165*
  - biopsy: 9058*
  - radiology: 6134,9055*
- etiology: 1365,1418*,3171*,3908*,4094,9116
- experimental: 9053*,10161*
- immunology: 5033*
- pathology: 426,445,1338*,2143*,2933*,3183*,4090,4191,5033*,5091,5096,5136*,6594*,7034*,7047*,7088,9050*,9052*,10160*,11362,11363,11364
- treatment: 428,478,535,560,1344,1352,1360,1361,2295*,2331,3857,4187,6101,7035*,7040*,9236,10343*,11170,11341

TRODUODENITIS: 8315

TROENTERITIS (see also Colitis; Enteritis; Enterocolitis): 207*,281,321,326,344,1248,1250,1252,1473*,5841*,5843*,5894,5900,8090,8091,8093,8906*,8919,8941,9011,9065*,9072*,10000*,10008*,11226*,11255
- epidemiology: 8092

TROINTESTINAL TRACT (see also specific organs; Cancer): 3124,3127,4962,9730
- absorption: 7796,8740,9749*,9763
- aging: 217,325,556,921,1206,1529,2129,3093,4863,4965,4966,5896,5948,8071,8085,9999*,10029,10078
- anomalies: 327,1194,3114,4969,5937,6989,8049,8963,9737,11229
- associated diseases: 206*,446,2219,3981,4959,5884*,5892*,5899,5906,5926,5930,5931,5946,6215,6216,6907*,7156,8059,8341,8425,8728,8752,8959,8960,9013
- biochemistry: 2225
  - chemical composition: 2855*,5631*,5635*,9999*
  - enzymes: 982,4630*,10933
- biopotentials: 63,95*,130*,1026*,1070*,1072*,1080*,1097*,1501*,1904*,2018*,2020*,2889*,2921*,2931*,3140*,3684*,3687*,3704*,3726*,3741*,3771*,4191,4678*,4721*,4786*,5666*,5700*,5763*,5764*,5768*,5772*,5777*,6419,6668*,6672*,6684*,6745*,6746*,7765*,7766*,7820*,7828*,7908*,7912*,8120*,8165*,8732,9052*,9320,9790*,9839*,9842*,10164*,10917*,10956*,10962*,

GASTROINTESTINAL TRACT (Contd.)
- biopotentials (Contd.): 10973*,10989*,10996,11018*,11077*,11078*
- carcinogenesis: 2179,8962,11866
- children: 1251,2218,2223,3104,3106,3115,3133,3877,3903,3942,3965,3975,3985,4967,5910,5915,5936,6874,6888,6918,6939,6956,6958,6988,8009,8086,8087,8105,8143,8341,8520,8740,8742,8917,8924,8928,8953*,9266*,9274,9398,9514,9516,9720*,9967,10003*,10008*,10038,10050,10053,10920*,11245,11246,11404*
- circulation: 22,1201,1244,1938,2837*,2863,3648*,3845*,3914*,4647,4651,4652,4655,4657,4658,4866,4968,4970,5920,5940,5941,6505,6649*,6843*,6850,6987,7721,8692*,8698,8948*,8950*,8971,9092,9149*,9672*,10002*,10004*,10071,10627*,10696,10698,11302
  - technics of study: 3230*,4634*,4636*,4648,4649,4650,4651,5629*,6640,7380*,7382*,7709*,8411*
- clinical studies: 5938,8084,8798,10067,10086,11234
- development: 25*,2851*,3680,5847*,8247*,8740,8814,8962
- diagnosis: 229,469,2188,3074*,3914*,3916*,4863,4874,4965,5938,5951,6178,6850,7151,7263,8036*,8925,8929,8957,8959,9013 9187,9516,11169,11770
  - biochemical procedures: 5844*,5891*,5895,6862,6875,6968,7856,7951,8003,8433,8792,8855,8918,8920,8949*,8961,9263*,9378*,9943,9945,10008*,10143*,10144*,10952*,11176,11177,11755*
  - biopsy: 1266,8120*
  - endoscopy: 1157*,1191,2131,6851,9944,9946,10720,11331*
  - radiology: 211*,216,482*,541,2120,2131,2133,3053,3054,3057,3059,3845*,3865,3866,3873,8377,3879,4871,5847*,5848*,5941,6065,6214,6845*,6898,7152,7996,8019,8037*,8046,8247*,8533,8814,8901*,8934,8938,8981,8988,9940*,9943,9949,9954,10082,10545,10698,10699,10843*,10998,11212,11601,11985
    - angiography: 206*,3028*,3048,3848*,4370*,5869,6599*,6843*,6853,6861,7739,7985*,7994,8237,8692*,8935,8948*,9941*,9952,10696.11161*,11302
    - lymphography: 10006*
- diseases: 256,1251,2121,2128,2153,2155,2212,2224,3052,3080*,3102,3117,3972,3981,4958,4966,5893,5905,5909,5930,5938,5959,6535,6857,6888,6963,6968,6969,6976,6979,6984,6986,6988,7989*,7999,8008,8056,8084,8085,8094,8113,8346,8929,8939,8947*,8948*,8961,9013,9113,9976,10044,10071,10077,10079,10080,10697,11165,11169,11173,11231,11233,11235,11256,11755*,11770
- diverticula: 6050*,10028,10029,11216*
- epidemiology: 1264,3075,3078*,4966,6972,8947*
- etiology: 3971
- fistula: 482*,2221,5952,6975,7466,8682,9009,

GASTROINTESTINAL TRACT, fistula, (Contd.): 11391,11965
  function: 5912,5931,6734,6766,8226,9309,11468,11601
  hormonal control: 6835,8032*,8034*,8417,9689*,9726,10998
  immunology: 3123,6217,6978,7712*,8334*,8949*,8962,9262*,9266*,9268*,9282,10073,11177
  metabolism: 2843,4659,6636,7989*,8950*,8979,9933,10087,11046*
  microorganisms: 1918
  morphology: 22,38,2851*,2859,2862,2863,2865,2874,5905,6217,7725*,8642,9988
  motility: 135*,1083*,1212,2951*,2953*,3937,4762*,4763*,4765*,4770*,4860,5775*,6747*,6748*,6751*,6759,7705*,7721,7922,8698,8809*,8814,8822,10057,10076,10923,
    pressure studies: 218,8120*
  mucosa: 1266,1905*,2855*,3680,5631*,6217,9737
  neoplasms: 2189,3965,3968,5934,5938,6887,8063,8438,10032
    benign: 1182,3966,4943,6973
    malignant: 266*,1182,1183,1261,2181,2190,3040,3088*,3115,3120,3121,3874,3915*,3967,4385*,4939,4944,4945,4946,5880,5928,6843*,6865,6974,8060,8061,8062,8333*,8505,8922,8923,8970,9975,10033,10034,10803*,11202,11238
  nervous control: 25*,446,993,2847,2953*,3047,3076*,4957,8701,8809*,9733,9749*,9988,10918*
    psychologic factors: 511,2494,3984,4955,5775*,6034*,8083,9996*,10920*,11230,11512.11806
  obstruction: 2223,3987,3988,5940,5941,6029
  pathology: 9943,10076,10081,10697,11167,11228*
  perforation: 1266,3960,3967,4836*,4967,6401
  polyps: 335,11013*
  secretion: 982,9819
  surgery: 221,968,1205,1213,2107,2118,2124,3046,3846*,3871,3988,4866,5845*,5875,5878,6319,8984,9980
  toxic effects: 312
    chemical: 2104,3043,3855,4968,8822,9066*,9218*,10030
    radiation: 3116,4338,5887*,8046
  trauma: 1197,2372*,3110,3126,5961,5962,6175,6439,6938,6987,8070,8967,10021,10022,10038
  treatment: 1640,1641,2220,3972,4965,5856,5857,5909,6137,6854,6864,8072,8926,8928,9182,9710,9976,10067,10082,11169,11173,11408,11565
    drug: 1168,1172,1175,1185,1204,1209,1211,1212,5893,5966,6235,6274,6449,6715*,6716*,6849*,6855,6856,6857,6859,6863,6870,6874,6885,6886,6888,6889,6894,6897,6900,6971,6992,7042*,7116*,7227,7276,7291*,7432,7495,7672,7677,7693,7705*,7716,7719,7862,7923,7995,8002,8006,8009,8010,8015,8018,8020,8023,8024,8257,8262,8418,8496,8556,8578,8670,8697,8704,8813*,8915,8940,8941,

GASTROINTESTIONAL TRACT (Contd.)
  treatment, drug (Contd.): 8955*,9199*,9200*,9201*,9202*,9213*,9215*,9275,9312,9313,9365*,9366*,9529,9536,9593,9677*,9728,9795*,9819,9856,9877,9937*,9955,9958,9959,9961,9963,9968,9970,9972,9973,9974,9975,9978,9980,9981,9984,9985,9990,10006*,10039,10075,10086,10087,10088,10159*,10178,10264*,10385,10411*,10440*,10453,10474,10571*,10626*,10662,10695,10709,10710,10713,10837*,10934,10966*,11133,11142,11160*,11162*,11167,11170,11171,11172,11174,11175,11179,11275,11357,11419,11449*,11499,11566,11688,11707,11755*,11949*
    enzyme: 4864,6899,7346,7999,8418.8798,10176
    hormone: 9097,11159*
    physical: 4867,7990*,8376,9030,11504,11505,11506,11507,11598
    surgical: 325,5934,5935,5936,5948,5976,5978,5979,6175,6887,6918,6921,6964,6966,6967,7240,7262,8048,8074,8078,8080,8140,8141,8456,8948*,8981,8990,9049,9324,9477*,9656,11166,11236,11237,11250,11251,11252,11510*,11743*
  water and electrolyte metabolism: 6684*,6710*,9060*,9727,10010*,10284,11101*,11139,11166,11250,11402*,11610,11621,11972
GASTROSCOPY (see Stomach, diagnosis, endoscopy)
GENETIC RELATIONSHIPS: 335,483*,582*,625,685,716*,917*,1449,1490,1495*,1533,1612*,1618*,1646,1797*,1908*,1911*,2146*,2210,2435,2541,2542,2664,2791,3004,3190*,3228*,3235*,3247,3301,3418*,3445*,3913*,3971,4029,4245*,4312*,4383*,5018*,5145*,5205*,5215*,5220,5246*,5364*,5511*,5946,5947,6200*,6341*,6381,6430,6546,6580,6911*,6915*,7071,7302,7309*,7356*,7357*,7392*,7967,8028*,8279*,8350*,8369,8371,8402,8446*,8469*,8584*,8625,8949*,8968,9096,9221,9244,9257*,9267*,9268*,9280,9402,9432*,9433*,9441*,9530,9532,9565,9599*,9652*,9862*,10040,10127,10306,10397,10407*,10435*,10448*,10600*,10609*,10610*,10680,11123,11215*,11516*,11517*,11528,11676*,11754*,11755*
  blood groups: 9*,941,1412*,1414*,1424*,1499*,2224,2435,3755,3908*,4174,5017*,5144*,5145*,5146*,6048*,7045*,7161*,7753*,8293*,8294*,8296*,8302*,8349*,9208*,9640*,11482,11952*
GLUCAGON: 93*,151*,1120,1409*,1565*,1583*,3796*,6814,7888*,8448*,8778,8813*,9807*,10567*,11093*,11103*
GLYCOGEN STORAGE DISEASE: 1646,3423*,3425*,3436*,5416,10611*,10679,10680,11754*

HEMOBILIA (see under Biliary Tract)
HEMOCHROMATOSIS: 735,742,791,792,1661,1676,1677,1678,1679,1680,1681,1682,1683,1684,1685,1686,1687,1688,1689,1944*,2633*,2691,2692,3426*,3438*,3475,3476,3477,3478,3479,3488,4332,4380*,4417,5035*,5368*,5369*,5370*,5422,5468*,6111*,6337*,7392*,7493,7989*,8225,8465*,8486,9434*,9450*,9460*,9500*,9529,9530,9761,9863*,11720*

- EMORRHAGE (see Bleeding)
- EMORRHOIDS: 635,649,653,1494*,1514,3376,4250*,4288,4289,4292,4298,5288,6274,6275,6276,6277,7240,8359,8385,10412*,10475,10476,11216*,11566
- EMOSIDEROSIS: 791,792,3426*,3480,4549*,6111*,6346*,7493,9143*,9306*,10649
- EPATECTOMY (see Liver, regeneration)
- EPATIC COMA (see Liver, coma)
- EPATIC VEIN THROMBOSIS (see Budd-Chiari Syndrome)
- EPATITIS (see also Liver, coma and entries under Liver; Jaundice): 1617*,2638*,2712,2752*,5437,5528,6379,6414,6426,6451,7569,8039*,8470*,8478*,8485,8524,8547,9447*,9469*,9628,9648*,9670*,10399,11736*,11801,11896,11899
  - acute: 728*,870,1733*,1757*,1787,2610*,2618*,2654,2682,3567,4368*,4439,4496*,4497*,4508,4521,4522,4548*,6331*,6421,6422,6452,7356*,7371*,9448*,9452*,9466*,9491*,9499*,9566*,10403*,10590*,10638,10603*,10604*,10681,10731,11748*,11850*,11900
  - aging: 876,2761*
  - associated diseases: 728*,796,862*,868*,869,870,876,877,1598*,1762*,1775,1788,1789,2753*,2754*,2764,2773,2776,3439*,3471,3537,3572,4408,5506*,6424,6425,6490*,6558,7473,7573*,7579*,11800,11890,11892
  - children: 861*,863*,865*,868*,912*,1756*,1759*,1764*,1766*,1767*,1779,1784,2750*,2764,2770,3416*,3540*,3547*,3556,3562,4502*,4506,4509,4510,4515,4516,4517,4518,4519,5361*,5518,6420,6488*,6504,6505,6506,6507,6508,6509,6514,6524,6525,6531,6538,6540,6541,6542,6546,6550,6557,6560,6561,7473,7476,7477,7556*,7557*,7561*,7565*,7567*,7577*,7582*,7583*,7584*,7590,7591,7603,7604,7606,8506,8592,8602,8603,8604,8609,9599*,9609*,9629,9630,9631,10636,10788*,10791*,10792*,10793*,10794*,10795*,10798*,10805,10815,11884*
  - chronic: 796,909,1675,1753*,1778,1785,1793*,1801*,2612*,2654,2669,2757*,3437*,3440*,3490,4368*,4406,4407,4499*,4500*,4507,4527,4548,5382*,5411,6324*,6328*,6333*,6420,6423,6425,6428,6429,6435,6450,6452,6453,6491*,6496*,6521,7356*,7363*,7381*,7393*,7394*,7397*,7447,7497,7570*,7571*,7602,8460*,8522,8523,8715*,8716*,9434*,9448*,9450*,9451*,9452*,9462*,9471*,9472*,9492*,9493*,9495*,9538,9566*,9614*,9638*,9676*,10408*,10588*,10589*,10590*,10594*,10604*,10636,10648,10731,10797*,10830*,10843*,11723*,11729*,11748*,11749*,11798,11802,11850*,11886*,11959
  - circulation: 6495*
  - clinical studies: 890,6545,8590,11894
  - complications: 866*,1753*,1780,3545*,5527,10810
  - diagnosis: 765,772,861*,864*,865*,867*,875,879,1600*,1755*,1758*,1765*,1767*,1768*,1769*,1771*,1777,2654,2750*,2751*,2756*,2757*,2758*,2759*,2760*,

HEPATITIS, diagnosis (Contd.): 2772,2777,3412*,3440*,3449,3544*,3559,3563,3566,3568,3569,3570,4509,4511,4512,4513,4516,4520,4522,4527,4529,4531,4533,4535,4536,5349*,5381*,5382*,6331*,6486*,6487*,6491*,6508,6510,6530,7294*,7387*,7396*,7572*,7583*,7584*,7586*,7592,7594,7599,7600,7603,8460*,8583*,9623,10792*,10808,10809,10811,10820,11891,11901
  - biochemical procedures: 6422,6520,6523,6536,6548,8522,8605,8606,9494*,9613*,9614*,9622,9629,10607*,10786*,10789*,10805,10807,10814,10815,11733*,11882*,11888*,11924
  - radiology: 6429
- epidemiology: 862*,878,880,1761*,1783,1791,1792,2762*,2763*,2771,3540*,3546*,3548*,3549*,3554*,3569,4503*,4524,4528,4537,5506*,5508*,5509*,6500*,6501*,6502*,6503*,6512,6528,6537,6545,6546,6551,6552,6559,8585*,8589,8590,8591,8593,8594,8595,9612*,9614*,9615*,9619,9620,10788*,10791*,10796*,10798*,10804,10818,11881*,11897,11898.11904,11908,11909,11918,11919
- etiology: 805,839,863*,909,1761*,1769*,1770*,1783,1790,1799*,2643,2768,3548*,3549*,3565,4524,6481,6497*,6498*,6499*,6502*,6503*,6517,7521*,7593,7596,10759,10788*.10800*,10812,10813,11888*,11889*,11905
- experimental studies: 726*,1765*,1768*,1769*,1772*,1773*,1786,1795*,2557*,2733,2765,3541*,3543*,3565,4499*,5502*,5503*,5504*,5511*,5512,6499*,6520,6554,7561*,7574*,7588*,7589*,8568,8599,8610,8611,8612,8613,9466*,9616*,9617*,10592*,10801*,10802*,10825,10826,11895
- immunology: 726*,860*,863*,875,890,1754*,1759*,1773*,1793*,3541*,3547*,3550*,4368*,4505*,4511,4512,4513,4514,4531,4533,4535,5365*,5505*,5520,6420,6423,6488*,6516,6519,6520,6548,6549,7563*,7573*,7580*,7581*,8584*,8585*,8586*,8602,9605*,9622,10592*,10814,11729*,11799,11903,11922,11923
- lupoid: 1597*,1598*,1642,1652,2612*,3441*,7495,9453*
- metabolic changes: 1756*,1757*,1760*,1763*,1766*,1787,1796*,3560,6492*,6493*,6494*,7567*
- microorganisms: 9621
- pathology: 859*,864*,872,874,1757*,1762*,1764*,1776,1791,1792,2643,2656,2765,2766,3416*,3442*,6324*,7375*
- toxic (see liver, injury, toxic agents)
- treatment: 1624*.1755*.1764*.1774.1779,1784,1785,3536,3537,3542*,3551*,3558,3567,4498*,4508,4523,5541,5543,6495*,6496*,6507,6519,6524,6525,6528,6530,6533,6538,6539,6541,6543,6544,6553,7495,7497,7557*,7558*,7559*,7560*,7561*,7562*,7563*,7570*,7574*,7582*,7583*,7598,7602,7605,8597,8598,8599,9493*,9495*,9538,9606*,9613*,9614*,9624,10594*,10657,10711,10795*,10796*,10797*,10820,10822,10823,11728*,11836,11850*,11879*,11880*,11913,11914,11915,11916,11959

HEPATITIS (Contd.)
  viral: 861*,862*,863*,864*,866*,867*,868*,869,871,872,873,874,875,877,912*,1753,1754*,1755*,1756*,1758*,1760*,1762*,1763*,1764*,1765*,1766*,1767*,1768*,1769*,1770*,1771*,1772*,1773*,1775,1776,1777,1778,1779,1780,1781,1782,1783,1784,1785,1786,1787,1788,1789,1791,1792,2443*,2618*,2750*,2751*,2753*,2754*,2758*,2759*,2760*,276[illegible],2762*,2763*,2764,2765,2767,2768,2769,2771,2772,2773,2774,2776,2777,3426*,3440*,3443*,3465,3540*,3543*,3545*,3546*,3547*,3548*,3549*,3550*,3551*,3552*,3555,3558,3559,3560,3562,3563,3565,3566,3568,3569,3570,3571,3572,4496*,4498*,4500*,4501*,4502*,4503*,4504*,4505*,4506,4507,4508,4510,4513,4515,4516,4517,4518,4520,4528,4529,4530,4531,4532,4533,4534,4535,4536,4537,4538,4540,5349*,5363*,5381*,5382*,5437,5502*,5503*,5504*,5505*,5506*,5507*,5508*,5510*,5511*,5512,5513,5514,5515,5516,5518,5519,5520,5525,5527,5531,5533,5534,5535,5538,5540,5541,5542,5543,6326*,6427,6428,6437,6489*,6490*,6492*,6493*,6494*,6495*,6497*,6498*,6499*,6500*,6501*,6502*,6503*,6504,6505,6506,6507,6508,6510,6511,6512,6513,6514,6516,6517,6518,6520,6521,6523,6524,6525,6526,6527,6528,6529,6530,6531,6533,6534,6536,6538,6539,6540,6541,6542,6543,6544,6546,6547,6548,6549,6550,6551,6552,6553,6554,6555,6556.6557,6558,6559,6560,6561.6767*,7375*,7393*,7396*,7400*,7557*,7558*,7559*,7560*,7561*,7563*,7564*,7565*,7566*,7567*,7568*,7570*,7571*,7572*,7574*,7575*,7577*,7579*,7582*,7583*,7585*,7586*,7587*,7588*,7590,7591,7592,7593,7594,7596,7597,7598,7599,7600,7601,7603,7604,7605,7606,8460*,8469*,8475*,8521,8583*,8584*,8585*, 8586*,8587*,8588*,8589,8591,8592,8593,8594,8597,8598,8599,8600,8602,8603,8604,8605,8606,8607,8608,8609,8610,8611,8612,8613,9450*,9459*,9462*,9495*,9575*,9591,9596*,9597*,9598*,9600*,9601*,9602*,9603*,9608*,9609*,9610*,9611*,9612*,9613*,9615*,9616*,9617*,9618,9620,9621,9623,9626,9629,9630,9631,9632,9633,9634,9647*,10602*,10606*,10612*,10620*,10657,10659,10786*,10787*,10788*,10789*,10790*,10791*,10793*,10794*,10795*,10796*,10797*,10802*,10803*,10805,10806,10807,10808,10809,10810,10812,10813,10814,10815,10816,10817,10819,10820,10821,10823,10825,10826,11644*,11719*,11735*,11737*,11746*,11750*,11879*,11880*,11881*,11882*,11883*,11885*,11886*,11887*,11888*,11889*,11890,11891,11892,11893,11894,11895,11897,11901,11902,11903,11904,11905,11906,11908,11909,11910,11912,11913,11914,11915,11916,11917,

HEPATITIS, viral (Contd.): 11918,11919,11920,11922,11923,11970
    acute: 860*,2766,3553*,3554*,4511*,5522,5529,5532,6586,7562*,7573*,7576*,7578*,7580*,8590,9460*,9604*,9607*,9624,9625,10588*,10607*,10800*,11811,10822
    associated diseases: 5523
    children: 5532,5536,5537
    chronic: 859*,860*,3541*,3553*,4512,4519,4523,4539,5526,9451*,9627,10738
    diagnosis: 5521,5522,5530,6488*
    epidemiology: 5517,5524
    immunology: 4526,5529
    prophylaxis: 1759*,1761*,2755*,2771,3540*,3550*,3561,3564,4524,4525,6486,6500,6509,6515,6519,7556*,7574*,7595,8595,8596,9605*,10792*,10798*,10818,10824,11884*,11907,11921
    treatment: 2275,5523
HEPATOLENTICULAR DEGENERATION (WILSON'S DISEASE): 716*,1616*,1627*,2617*,2648,2717,3408*,3409*,3410*,3457,3458,4387*,4453,4548*,5352*,5414,6380,6381,7389*,7390*,7434,7435,8477*,9431*,9432*,9433*,9509,9510,9511,10599*,10600*,10664,10665,10666,10667,11794,11795
HEPATOMEGALY (see Liver, disease)
HERNIA (see also Diaphragm, rupture): 651,3122,4280,4294,5976,5977,6626,6920,7130,7269,7700,8216,8947*,8977,9984,11200,11216*,11402*
  children: 5975,10014
  diaphragmatic: 389,390,391,394,1297,1302,1311,2246,3159,4044,4045,4046,5990*,6029,6995*,7018,8143,9041,9042,9043,9044,9045,10013,10130,10134,10136,11302,11303,11304
  femoral: 329,3978,5978,6919,8077,8978
  hiatal: 345*,346*,347*,349*,351*,353*,386,387,392,393,395,396,423*,1279*,1284*,1288*,1290,1291,1292,1293,1296,1323,2230*,2233*,2234*,2238,2239,2241,2242,2243,2244,2245,2354,2856*,3135*,3138*,3141*,3156,3157,3158,3159,3160,3161*,3162*,3163*,3164,3165,3992*,3995*,3996*,3998*,3999*,4000*,4002*,4003*,4033,4047,4048,4049,4050,4837*,4972*,4973*,5005,5006,5007,5008,5009,5010,5011,5066,5627,5900,5988*,5989*,5991*,5992*,5995*,6025,6026,6027,6028,6849*,6977,6995*,6996*,6997*,7016,7017,7036*,7050*,8002,8050,8116*,8119*,8121*,8123*,8127*,8140,8141,8142,8144,8145,8277*,9018*,9019*,9020*,9023*,9028,9046,9047,9048,9049,9719*,10091*,10131,10132,10133,10135,10138,10139,10140,10156*,10159*,11280*,11284*,11309,11310.11311 11322*
  inguinal: 314,329,1214,1258,2213,2499,3376,3978,3979,4279,4890,5974,5975,5978,6858,6859,6918,6921,6922,8074,8075,8076,9983,10015,11245,11246
HIRSCHSPRUNG'S DISEASE (see Megacolon, congenital)
HISTAMINE: 11*,13*,68*,69*,85*,90*,91*,93*,96*,103*,104*,116*,117*,122*,123*,128*,129*,132*,133*,573*,1038*,1044*,1046*,1047*,1053,1068*,1069*,1075*,1084*,1110*,

ISTAMINE (Contd.): 1900*,1903*,1941*,1970*,1972*,1977*,1978*,1980*,1983*,1984*,1986*,1987*,1988*,1990*,1991*,1992*,1994*,1995*,2006,2286*,2298*,2300*,2349,2362*,2412*,2836*,2879*,2892*,2916*,2917*,2920*,2928*,2929*,2930*,2933*,2935*,2957*,3185*,3272*,3273*,3275*,3291,3644*,3669*,3717*,3718*,3721*,3722*,3735*,3739*,3745*,3748*,3749*,3754,3781*,4168*,4704*,4705*,4706*,4712*,4717*,4718*,4719*,4721*,4722*,4723*,4727*,4730*,4738*,4959,5140*,5143*,5149*,5300*,5630*,5635*,5655*,5696*,5697*,5698*,5704*,5712*,5718*,5719*,5748*,6099,6155*,6159*,6160*,6347*,6696*,6698*,6699*,6703*,6704*,6706*,6707*,6708*,6709*,6710*,6711*,6712*,6714*,6731*,6749*,6772*,7053*,7174*,7179,7707*,7779*,7797*,7799*,7805*,7806*,7809*,7810*,7812*,7814*,7815*,7816*,7817*,7819*,7820*,7828*,7829*,7830*,7834*,7836*,7837*,7869,7908*,7917,8039*,8040*,8057,8172*,8174*,8291*,8301*,8471*,8755*,8758*,8760*,8761*,8765*,8767*,8768*,8769*,8776,8860,8887,8951*,8955*,9052*,9079*,9088*,9098,9206*,9720*,9745*,9767*,9768*,9770*,9771*,9772*,9773*,9774*,9776*,9778*,9785*,9791*,9797*,9800*,9801*,9805*,9814*,10172,10173,10234,10337*,10537*,10933,11011*,11012*,11016*,11027*,11032*,11033*,11034*,11035*,11036*,11037*,11039*,11041*,11044*,11047*,11048*,11049*,11054*,11055*,11056*,11147,11170,11323*,11341,11343,11344,11444*,11450*,11457*,11498

YPOTHERMIA (see also Bleeding, treatment, cooling; Ulcer, peptic, gastroduodenal, treatment, freezing): 146*,340,403,427,858,997,1459,1633*,2130,2350,2351,2352,2418*,2419,2422,2428,2559,3207,3677,3678,3851*,4066*,4104,5641,5642,5710*,5929,6186,6354*,6358*,6359*,6360*,6867,7120*,7128,7184,7198,7339*,7379*,7940*,8001,8298*,8825*,8840,8842,9088*,9105,9216*,9416*,9440*,9481*,9939*,10103,10199,10525*,10595*,11143,11356,11853*

ICTERUS (see Jaundice)

ILEOCECAL VALVE: 2475*,2498,2512,4155,4770*,6236,7245,9736*,10269*,10288,10494,11412

ILEUM (see also Intestine, Small): 137,513,1013*,1026*,1069*,1077*,1078*,1385,1388,1475*,1929*,2016*,2021*,2368*,2370*,2373*,2374*,2399,2409,2498,2512,2898*,3231*,3243,3774*,3775*,4127,4129,4143,4246*,4629*,4684*,4698*,5285,5653,5673*,6108*,6113*,6118*,6129,6142,6664*,6749*,6753,6754,6758,7120*,7129,7150,7245,7722,7760*,7761*,7831*,7881*,7886*,7921,8245*,8264,8332*,8338,8366,8807*,8808*,8818,8823,8902*,9139*,9140*,9167,9180,9195,9196,9290*,9736*,9754*,9790*,9839*,9844*,9852,10007*,10258*,10265*,10285,10286,10288,10291,10310,10316,10515,10937*,10955*,11412,11517*,11620

ILEUS (see also Intestine, Large, obstruction; Intestine, Small, obstruction): 487*,499,503,620,1379*,1386,1387,1395,1501*,2110,2367*,2369*,2374*,2482,3258,3261,3263,3264,3265,3852*,4153,4247*,5117,5118,5119,5120,

ILEUS (Contd.): 5121,6123,6124,6125,7121*,7151,7152,7236*,8244*,8250,8361*,9187,9188,9189,9365*,10266*,10304,10307,10436*,11399*,11401*,11403*,11433,11598,11599

   biliary: 4141,4142,6624,7153,8251

IMMUNOLOGY (see also specific disease, organ; Microorganisms): 5*,538,1000,1001,1217*,1375*,1473*,1476*,1911*,1920,1945*,2083,2084,2119,2195,2197,2755*,3033*,3050,3127,3256,3570,3945,6893,7131,7207*,7220,8031*,8705,9676,10005*,10049,10963*,11194,11232,11406

INFARCTION (see also specific organ; Cardiovascular System): 7012,7130,8244*,8466*,8948*,9019*,9144*,9167,9168,9170,9171,9172,9173,9520,9719*,10005*,11228*,11682,11797

INSULIN: 41*,76*,91*,562*,1045*,1047*,1327*,1409*,1672,1920,1972*,1973*,1987*,1990*,2916,2920*,2922*,2945,3023,3050,3205,3421*,3641*,3650,3747*,3796*,3797*,3798*,3818,3860,4663,4664,4720*,4730*,4765*,4877*,5699*,5796*,5801*,6042*,6165*,6349*,6477,6671*,6700*,6708*,6711*,6714*,6744*,7053*,7615*,7770*,7815*,7835*,7928*,7965,7978,8705,8757*,8758*,8807*,8850,9134,9205*,9380*,9434*,9579,9744*,9778*,9782*,9787*,9791*,9797*,9807*,9808*,9815,9817,10337*,10935*,11021*,11035*,11049*,11093*,11141,11444*

INTESTINE, LARGE (see also Appendix; Colitis; Constipation; Diarrhea; Dysentery; Enterocolitis; Ileocecal Valve; Ileus; Intussusception; Megacolon; Rectum; Volvulus): 5939,6139,6634,7760*,7871*,11598

   absorption: 59*,1029,2881*,2902*,3706*,4679*,4682*,4684*,5665*,5666*,6222*,7794,8720*,8746,8747,10992,10993,10995

   aging: 112*,1503*,2473*,3367,6634,9334,10433*,10504

   anomalies: 612,2491,3949,5247*,6123,7144,7145,7146,7147,7204,7257,8273,8374,8380 9184,9361,10311,10316,11423,11557

   associated diseases: 619,4273,4287,4308,4960,7229*,7234*,8047,9293*,9329*,11215

   biochemistry

      chemical composition: 3673*,7707*

      enzymes: 1901*,4629*,5634*,5673*,10921

   carcinogenesis: 988,7252,11544*,11546*

   children: 595*,1492*,2484,3347,3348,3352,4259,4297,5263,5903,5973,6122,6230*,6269,6270,6985,7134,7228*,7239*,7266,7271,8254,8367,8368,8741,9158,9292*,9326,9338,9991*,10312,10470,10479,10504,10513,11402*,11575

   circulation: 1537,3363,4135,4140,4243*,4285,4633*,4653,4654,4656,5247*,6261,7119*,7126,7238*,7709*,8126*,8382,8965,9146*,9172,9310,10096*,10258*,10432*,10950,11418,11429

   clinical studies: 6120,11580

   development: 5634*,6132

   diagnosis: 622,650,1527,2500,2523,3347,3916*,4300,4778,4834*,4964,6224*,6269,6271,7241,7263,7280,9298*,9340,10012,10458,11568

      biochemical procedures: 9293*,10446*,10531,11197

      biopsy: 2537*,6229*,6231*,7230,8351*,

- INTESTINE, LARGE, diagnosis, biopsy (Contd.): 8354*,9295*,9321,9364*,10440*,10487,10531
    - endoscopy: 1190,1541,4308,4309,5274,5275,5276,6203*,11599
    - proctosigmoidoscopy: 1086*,9323,9366*,10444*,10447*,10487,10518*,11581,11640*
    - radiology: 219,612,2101*,2490,2498,3067,3335*,3341,3342,3350,3362,3875,4140,4155,4301,5112,5233*,5238*,5240*,5245*,5272,6231*,6378,7131,7140,7229*,7277,8254,8351*,8360*,8377,8379,9178,9290*,9291*,9296*,9302*,9348,9365*,10469,10486,11542*,11547*,11582,11583,11591,11603,11606,11635,11640*
        - angiography: 6844*,10432
        - lymphography: 6246,6844
  - diseases: 644,668,1538,1539,2122,2481,2505,2530,3052,3304*,3339*,3365,3366,3374,3936,4140,4272,4279,4291,4868,4909,5112,5241*,5279,5858,5903,5927,6280,6896,6900,6985,7126,7128,7131,7138,7201,7264,7279,7282,7283,8031*,8114,8262,8338,8382,8394,8395,8997,9167,9279,9290*,9312,9314,9325,9336,9366*,9425,9968,9977,10048,10265*,10298,10299,10438*,10455,11221*,11257,11555,11556,11559,11580,11657
  - diverticulitis: 616,627,628,1290,1498*,1505*,1545,1546,1547,1548,3349,3350,4252,4253,4254,5235*,5236*,5237*,5266,5267,5268,5269,5270,5271,5627,6261,6262,6263,6264,6265,7199*,7261,7262,7891*,8050,8353*,8357*,8360*,8362,8363,8364,8365,8947*,9302*,9336,10436*,10437*,10459,10460,10461,10462,10463,10464,11550*,11596,11597
  - epidemiology: 2495,9298*,11550*,11555
  - fistula: 546,1528,1537,1547,2502,2522,4839*,4925,5179,5268,6058,6143,7149,7150,8964,9224,9334,9365,9691,9692,9997*,10320,10436*,10437*,10445*,10464,10480,11591,11594
  - hormonal control: 5665*,5666*,9808
  - immunology: 2514,7712*,7713*,8035*,8349*,8741,9632,9633,9991*,10431*,10468,11223*,11549*,11602
  - irritable colon: 1824*,3338*,6281,7228*,7274,7891*,8039*,8240*,8376,9237,9302*
  - metabolism: 5645,6739,7212*,8702,8707,9732,9757,9758,10074,10337,10989*,10995,11559
  - microorganisms: 619,1912*,2134,2475*,2846,4883*,4904,5632*,5646,6632*,6740,6878,6883,6885,6895,7304,7707*,8032*,8089,8112,8491,8704,8707,8903*,8942,9964,9966,9970,10047,10048,10052,10055,11197,11425,11426,11529,11574,11637,11666
  - morphology: 1498*,1934,2853*,2867,5245*,5650*,5673*,6635,6655,6656,6657,8243*,8354*,8729,9010,9301*,9362,9736*,10439*,10936*,10950,11077*,11664
  - motility: 125,260*,940,1070*,1071*,1086*,1379*,1501*,2101*,3769*,4291,4769*,4770*,5235*,6745*,6748*,6763,6764,6765,6910*,7135,7228*,7882*,7886*,7888*,7889*,7890*,7891*,7893*,7894*,7896*,7915,8397*,8816,9138*,9344,9725*,9839*,9848*,9849*,

- INTESTINE, LARGE, motility (Contd.): 10288,11070*,11073*,11442*
    - pressure studies: 4751*,4778,4840*,5244
  - mucosa: 1493*,1901*,2514,2853*,2855*,4246* 4629*,5650*,6203*,6231*,7128,7704*,7712* 7713*,8238*,8349*,8354*,9152,9321,9732,10456,10487,10531,10989*,11363,11564
  - neoplasms: 4155,4862,5265,6246,6272,7242,7245,10510,10511,11436,11635,11638
    - benign: 602,611,622,634,4139,4301,5238*,6222*,7984*,9160,11412,11608
    - malignant: 614,617,622,625,629,646,648,1378*,1496*,1519,1520,1521,1522,2147*,2473*,2476*,2477*,2478*,2486,2493,2504,2513,2514,2524,2525,2527,3335*,3340*,3368,3372,3373,3673*,3875,3911*,4244*,4245*,4300,4302,4305 4320,5238*,5248*,5249*,5250*,5251*,5252,5254,5256,5257,5302*,5303*,5307,5955,6225*,6227*.6236,6238,6239,6241,6242,6243,6245,6247,6248,6249,6289,7154,7231*,7238*,7243,7244,7246,7247,7448,7249,7250,7251,7293*,7984*,8033*,8034*,8042*,8355*,8357*,8358*,8359*,8360*,8361*,8386,8387,8389,8390,9163,9179,9291*,9303*,9304* 9305*,9306*,9307*,9337,9347,9348,9349 9350,9354,9355,9356,9357,9366*,9368,9719*,9995*,10035,10436*,10437*,10443*,10444*,10445*,10446*,10447*,10449*,10450*,10482,10495,10496,10500 10501,10503,10504,10505,10506,10508,10509,10520*,11220*,11541*,11543*,115 11545*,11633,11634,11637,11639,11678*
    - villous: 7250,10449,11609,11611
  - nervous control: 1913,5112,6223*,6655,6656 6745*,7229*,7709*,8816,9156,9301*,10439,11071*,11073*,11077*,11558
    - psychologic factors: 11551*
  - obstruction: 498,503,651,687,1070*,1262,2472*,2480,2491,2500,2511,3343,3977,4283 4286,5959,5973,6102,6120,6122,6123,6132,6144,6264,7140,7141,7143,7239*,7267,8232,8258,8359*,8994,9183,9184,9186,10000*,10001*,10308,10311,10312,10433*,10436*,10437*,10499,10505,11402*,11403*,11418,11561,11562
  - pathology: 7230*,10065,10074,10394*,10501,11511*,11597
  - perforation: 623,1530,2477*,2484,2508,2528 3342,3916*,5264,5270,5271,5279,6232,6233,6234,6248,6268,6269,7273,8350*,8361*,8364,8381,9176,9299*,9301*,9365*,10001*,10084,10436*,10437*,10460,10472,11560
  - perfusion: 9304*
  - polyps: 638,639,640,643,1493*,1495*,1533,1543,2476*,2518,2519,2525,3352,4244*,4245*,4259,5238*,5240*,5251*,5928,5956,6222*,6224*,6254,6255,6256,6257,6258,6259,6260,7241,7287,8355*,8359*,8360*,8368,8369,8371,9291*,9305*,9306*,9307*,9337,9338,9355,10435*,10449*,10465,10467 10468,10469,10470,10496,11215*,11540*,11600,11601,11602,11603,11604,11605,11606,11637,

ITESTINE, LARGE (Contd.)

- secretion: 59*,2853*,4698*,6222*
- surgery: 594*,598*,614,618,628,630,632,642,652,655,1502*,1509,1520,1525,1526,1527,1534,1536,2370*,2371*,2409,2472*,2475*,2486,2502,2506,2528,2531,3039*,3125,3304*,3337*,3354,3355,3356,3363,3367,3370,3744*,3982,4246*,4248*,4258,4264,4276,4277,4278,4283,4284,4302,4305,4839*,4840*,5237*,5238*,5248*,5249*,5257,5269,5284,5285,5876,5959,6125,6144,6220*,6224*,6226*,6227*,6228*,6230*,6250,6251,6256,6842*,6880,6881,6902,6903,7119*,7140,7143,7149,7150,7204,7212*,7232*,7238*,7249,7256,7270,7271,7272,7281,7288,8243*,8255,8258,8353*,8356*,8357*,8361*,8362,8364,8365,8367,8372,8902*,8994,9085*,9138*,9141*,9196,9294*,9298*,9299*,9308*,9315,9317,9318,9319,9322,9328,9339,9345,9365*,9719*,9799*,9935*,10265*,10273*,10280,10281,10399*,10400*,10433*,10434*,10436*,10437*,10441*,10460,10465,10478,10479,10482,10483,10488,10489,10513,10515,10516,10517,10523*,11200,11215*,11541*,11542*,11546*,11551*,11555,11597,11608,11614,11617,11618,11621
- toxic effects:
  - chemical: 4964,7137,7283,9152,9292*,10431
  - radiation: 632,3337*,4251,6137,6231*,8378 9152,11425,11426
- transplantation: 10516
- trauma: 5278,9177
- volvulus: 633,1535*,1536,4255,4256,4257,4258,5272,7134,7142,7232*,8392,9346,10433*,10434*,10458,11579

NTESTINE, SMALL (see also Absorption; Duodenum; Enteritis; Ileum; Ileus; Ileocecal Valve; Intussusception; Jejunum; Malabsorption; Meckel's Diverticulum; Ulcer, peptic): 501,5939,6139,7760*,7793,7871*,8226,9309

- absorption: 7794,8332*,8718*,8746,8747,9754*,10271*,10272*,10287,10992,10993,10995,11521*,11528,11529,11532,11533
- aging: 29*,3700*,6110*,7123*,9334
- anomalies: 2386,3032*,3264,3307,3949,6123,6130,6905*,7133,7144,7145,7146,7147,7148,7204,8271,8272,8273,9145*,9182,9184,10291,10311,10316,10317,10318,10319,11423,11435,11557
- associated diseases: 65,320,483*,2392,2408,2552,2602,3236*,3243,4246*,4960,6112*,6117*,6130,6161*,8047,8058,8271,9082*,9165,9743*,10306
- biochemistry: 980*,989,1024*,1910*,1914,2382,2383,2882*,2885*
  - chemical composition: 978*,1915,3642*.3649*,3651,3654,3673*,3735*,6643*,6683*,7707*,7714*,7762*,10922*,10953*,10977*
  - enzymes: 985,1013*,1060*,1062,1901*,1908*,1917,1919,1923,2375*,2380*,2840,2844,2898*,3228*,3668*,3670*,3697*,3700*,3711,4629*,4631*,4685*,4686*,5215*,5478*,5639*,5672*,5673*,5688,5759*,6118*,6204*,7122*,7166*,7211*,7704*,7753*,7764*,7987*,10921*,11066

INTESTINE, SMALL (Contd.)

- carcinogenesis: 7252,11544*
- children: 485*,1060*,1395,2377*,2388,2389,3246,3251,3254,3259,3269,3671*,4150,4154,4158,4210*,4215,4216,4121*,4129,5116,5653,5903,5933,5973,6113*,6121,6122,6678*,6950,6985,7134,8253,8254,8256,8259,8730,8741,9158,9267*,9751*,9831*,10259*,10269*,10304,10312,10395,10470,11184,11401*,11402*,11438
- circulation: 34,518*,1020*,1383,1402,1941*,1942*,2362*,2369*,2879*,2882*,2904*,3230*,3249,3262,3664*,3699*,4117*,4125*,4135,4136,4140,4634*,4636*,4653,4654,4656,4669,4761*,5110,5628*,5629*,6116,6633*,6685*,6905*,6908*,7119*,7126,7130,7709*,7769*,7789*,8126*,8240*,8257,8274,8965,9146*,9153,9170,9172,9754*,10258*,10270*,10432*,11330*,11398*,11417,11418,11429,11458*
- clinical studies: 6120,6136,9182
- development: 2*,32,1025*,1923,1947*,1952*,2375*,2861,2884*,2894*,2898*,2899*,2908,2909,3666*,3668*,3695*,3697*,4631*,4669,6118*,6132,6644*,6645*,6678*,9181
- diagnosis: 1395,3233*,3250,3916*,4132,4834*,4964,5110,7335*,8170*,8328,10012,10416,11413
  - biochemical procedures: 10930,11197,11397*,
  - biopsy: 484*,1188,1380*.1401.1477,2360*,2361*,2380*,2389,3235*,3255,3872,4116*,5108*,5109,6114*,6218,8240*,8241*,8246*,8313,8721*,8730,8904*,9084*,9143*,9150 9256*,9259*,9260*,9261*,9262*,9272,9371,9748*,10259*,10261*,10297,10321,10322,10401*,10403*,10406*,10410*,10412*,10980*,11434,11516*,11517*
  - endoscopy: 3051,4841*,6852,8274,11499
  - radiology: 219,220,482*,493,496,641,1405,2101*,2384,2398,2602,2817,3067,3253,3293,3671*,4131,4140,4155,5112,5121,5130,5214*,5653,5867,6134,6141,6161*,6579,6750*,7116*,7127,7131,7140,8254,8275,8937,9178,9290*,9388,9950,10214,10304,10307,10313,10323,10324,10406*,10412*,11209,11210,11211,11334*,11358,11401*,11424,11430,11432,11971,11994
    - angiography: 1388,2399,4374*,5130,6844*,10432,11208,11400*
- disaccharidases: 489,490,1025*,1060*,2899*,2908,3235*,3329,4120*,4137,4632*,5200*,5660*,5759*,5760*,6113*,6675*,6676*,6677*,6678*,6695,6739,7205*,7465,7704*,7764*,7792,7875*,8331*,8721*,8731,9256*,9257*,9260*,9261*,9267*,9281,9288,9752*,9831*,10074,10259*,10299,10403,10404,10411*,10524*,10953*,10985*,11513*,11516*,11520*,11538
- diseases: 480*,483*,1375*,1383,1389,1391,1399,1400,1402,1404,2122,2376*,2381,2385,2391,2395,2404,2466,2579,3090,3233*,3249,3374,3909*,3919*,3936,3986,4116*,4124*,4127,4129,4140,4158,4909,4940,5106*,5110,5112,5124,5149*,5853,5903,5927,6119*,6138,6864,6896,6900,6985,6992,7117*,7118*,7126,

- INTESTINE, SMALL, diseases (Contd.): 7128,7131,7138,7139,7201,7203,7769*,7924,7991*,8031*,8114,8244*,8245*,8262,8269,8299*,8313,8338,8997,9143*,9149*,9153,9167,9168,9169,9247*,9279,9290*,9751*,9950,9968,9977,10048,10140,10198,10260*,10265*,10266*,10286,10287,10296,10298,10299,10314,10317,10321,10425,10455,11221*,11257,11406,11408,11413,11438,11460,11521*
  - diverticula: 485*,1290,1407,2373*,2387,2396,2405,3237*,3267,3268,4148,4238,5105*,5114,6133,6134,6135,6136,7335*,8265,8266,8267,8268,8328,8947*,9191,9192,9193,9194,9674*,10292,10293,10294,10295,10459,10461,10958*,11322*,11422,11432
  - epidemiology: 4209*
  - fistula: 482*,1259,1864,2401,3243,3260,4143,4144,4925,5111,5179,6058,6143,7149,7150,9174,9248*,9334,9701,9844*,10320,10382,10392*,11419,11420,11466
  - hormonal control: 7122*,8700,9808*,9840*,10955*
  - immunology: 20,483*,1337*,4631*,7706*,7722,7780*,8741,9632,9633,10409,10988*,11222*,11223*
  - metabolism: 6*,7*,130*,490,576*,997,1415*,2839*,3785,4122*,4465,4664,4665,4689*,5664*,5797*,6639,6681*,6739,6771*,7212*,7708*,7711*,7714*,7743*,7744*,7759*,7762*,7765*,7766*,8702,8707,9719*,9731,9732,9741*,9748*,9757,9831*,10074,10332,10333,10426,10954*,10961*,10970*,10995,11219*
  - microorganisms: 494,1912*,2134,2377*,2475*,2846,3229*,3242,4883*,4904,5209*,6116*,6117*,6119*,6415,6632*,6740,6878,6884,6895,7304,7707*,8032*,8089,8094,8112,8491,8704,8707,8903*,8904*,8942,9964,9966,9970,10007*,10047,10048,10052,10055,10297,10410*,11184,11197,11425,11426,11529,11666
  - morphology: 28*,29*,34,488*,1003*,1004*,1929*,1939,1952*,2850*,2854*,2858,2861,2866,3663*,3664*,3666*,3669*,3699*,3740*,4669,4672,5653,5659*,5660*,5664*,5672*,5673*,5675,6063,6643*,6648*,6655,7736,7848*,8241*,8243*,8246*,8260,8276,8313,8700,8729,9010,9130,9181,9212*,9258*,9284,9736*,9739,10070,10261*,10278,10411*,10417,10419,10932,10936*,10937*,10940,10994,11409,11410,11414,11527,11620
  - motility: 57*,102*,124*,137,481*,1009*,1071*,1072*,1073*,1075*,1077*,1081*,1082*,1084*,1088*,1089*,1394,1902*,1979*,2016*,2017*,2018*,2019*,2021*,2022*,2023*,2028,2029,2032,2101*,2103*,2291*,2292*,2379*,2954*,2955*,2956*,2957*,2959*,2961*,2962,2965,3769*,3774*,3775*,3777*,3779*,3781*,3782*,3856,4073,4123*,4138,4753*,4754*,4759*,4770*,5628*,5701*,5767*,5773*,5774*,5777*,5778*,5779*,5879,6188,6713*,6742*,6746*,6748*,6749*,6753,6754,6755,6756,6758,6760,6761,6763,6764,6765,6910*,6912*,6916*,7042*,7116*,7135,7710*,7715,7765*,7787*,7881*,7882*,7883*,7886*,7893*,7894*,7896*,7897*,7902*,7908*,7909*,7910*,7911*,7921,7924,8167*,8242*,8804*,8805*,8806*,8807*,8808*,8818,8820,8823,9138*,9720*,9838*,9839*,9840*,9842*,9843*,9844*9848*,9849*

- INTESTINE, SMALL, motility (Contd.): 9852,10268*,10283,10288,11068*,11070*,11072*,11074*,11075*,11081,11082,11442*
    - pressure studies: 2018*,3772*,4754*,4761*,11674*
  - mucosa: 6*,15,34,481*,483*,484*,978*,985,1014*,1024*,1034,1060*,1188,1374*,1375*,1401,1477*,1901*,1908*,1910*,1917,1919,1979*,1991*,2340,2360*,2368*,2375*,2380*,2382,2383,2414*,2552,2857,2866,3229*,3233*,3235*,3257,3651,3656,3642*,3663*,3664*,3669*,3670*,3733*,3873,4116*,4118*,4124*,4128,4158,4629*,4632*,4665,5149*,5214*,5688,5759*,5779*,6030*,6063,6112*,6114*,6119*,6138,6648*,6695,6907*,7128,7130,7164*,7704*,7706*,7723*,7744*,7758*,7875*,7987*,8238*,8241*,8246*,8276,8299*,8310,8313,8340,8586*,8700,8721*,8723*,8730 9072*,9084*,9130,9142*,9152,9256*,9258*,9284,9731,9732,9741*,9748*,10007*,10259*,10261*,10297*,10333,10334,10403*,10411*,10412*,10414,10419,10922*,10934,10961*,10980*,11066,11334*,11409,11496,11514*,11521*,11530
  - neoplasms: 497,508,2376*,3250,4155,5862,7245 10325,11436
    - benign: 448,1524,2393,4139,6991,7125,8263,9164,9166,10300,10326,10327,10328,10330,11412
    - malignant: 1400,1404,2399,2402,2403,2408,3232*,3266,3673*,4154,4156,4157,4339,4342,5130,5131,5215*,5303*,5848*,5955,6108*,6126,6127,6219,6242,7125*,7154,7155,7157,8178*,8247*,8264,8336*,9164,9166,10301,10326,10327,10329,10330,10331,11399*,11544*
    - villous: 10301
  - nervous control: 1048*,1089*,2913*,3774*,5112,6655,6702*,6746*,6761,6912*,6992,7117*,7118*,7166*,7709*,7725*,7736,7897*,7909*,7910*,7911*,9156,9838*,10150*,10266* 11071*,11078*,11414
  - obstruction: 498,504,505,506,512,1088*,1262,1379*,1392,1393,1396,2374*,2378*,2379*,2388,2390,2406,2480,3082*,3084*,3236*,3238*,3244,3251,3252,3253,3254,3287,3977,4063*,4070,4125*,4144,4145,4146,4147,4150,4183,5125,5126,5127,5128,5129,5209*,5324,5959,5973,6109*,6120,6121,6122,6123,6132,6144,7123*,7125*,7140,7141,7143,8232,8253,8257,8258,8259,8261,8269,8270,8290*,8994,9141*,9170,9180,9181,9183,9184,9185,9186,9189,9190,10000*,10001*,10275*,10305,10306,10308,10309,10310,10311,10312,10313,10318,10416,11072*,11399*,11400*,11402*,11416,11417,11418,11430
  - pathology: 3235*,9182,10007*,10074,10279,11438,11534
  - perforation: 220,419*,437*,1385,1530,2396,3255,3916*,4132,4149,5113,6142,6199,8265,8350*,8458,9175,9176,10001*,10084,11247
  - perfusion: 1033,7755*,7831*,7887*,9743*,9745*,9752*,9753*,9791*,11074*
  - polyps: 5956,10470,11604

ESTINE, SMALL (Contd.)
secretion: 1048*,1979*,2839*,2854*,3719*,3740*,4698*,4737*,5673*,6645*,7848*,7858,8523,8730,8766,9742*,9812*,9813*,10287,11060
surgery: 421*,446,499,513,931,952,1334*,1382,1384,1525,1572,2370*,2371*,2385,2386,2397,2400,2404,2407,2409,2817,3039*,3231*,3232*,3240,3258,3260,3982,4119*,4122*,4134,4136,4144,4156,4339,4599,4632*,5029*,5128,5129,5231,5243*,5661*,5664*,5701*,6041*,6109*,6116*,6129,6136,6144,6842*,6880,6881,6902,6903,6906*,7083,7119*,7123*,7124*,7125*,7129,7132,7670,7992*,8239*,8242*,8243*,8252,8255,8256,8258,8260,8518,8648,8650,8651,8678,8902*,8954*,8994,9085*,9090*,9093,9132,9137,9138*,9139*,9140*,9141*,9148*,9161,9174,9195,9196,9287,9407*,9667*,9714,9715,9719*,9799*,9935*,10181,10265*,10266*,10267*,10268*,10269*,10271*,10272*,10273*,10274*,10275*,10276,10277,10280,10281,10282,10285,10293,10326,10392*,10399*,10400*,10408*,10441*,10515,10546,11200 11222*,11298,11330*,11405*,11407,11420,11421,11620
toxic effects: 3699*
   chemical: 14*,2023*,3695*,4120*,4126*,4128,4964,5104*,5107*,5122,5123,5470*,5471*,5636*,7122*,7137,7874*,8944,9152,9246,10409*
   physical: 6746*
   radiation: 16,54*,488*,507,1381*,6115*,6137,6638,9152,9269*,10333,10334,10426,11415,11425,11426
transplantation: 2368*,2373*,2385,2410,2411,3233*,3256,8425,8426,8427,9147*,10270*,11619
trauma: 1406,2372*,2398,2407,5113,9177,10041,10263*
ulcer, nonspecific: 4125*,4133,4149,4203,6128,8249,8335*,9157,10289,10290
volvulus: 2374*,7134,7142,8261,9141*,9147*,9155,9719*,10272*,11431
USSUSCEPTION: 461,502,1376*,1403,1499*,2483,3245,3246,3247,3259,3919*,4121*,4130,5115,5956,6122,6131,7082,7280,8254,9141*,9160,9326,10000*,10314,10315,10631*

NDICE: 481*,964,1614*,2333,2671,2680,3470,5603,6399,6408,6512,7568*,7569*,7585*,8467*,8481*,8636*,9365*,9466*,9564,9565,9575*,9597*,9610*,9641*,9644*,9667*,9670*,9862*,10618*,10686,10800*,10827*,10828*,10832*,10839*,11644*,11732*,11791,11873,11879*,11946,12003
associated diseases: 6407,8505,9145*,10579,11819
clinical studies: 6411
diagnosis: 720*,912*,927,1839,1843,1927*,2630*,2672,2821,3557,3603*,3623,4586*,4589*,4596,4609,5600,5848*,6329*,6586*,6587*,6602*,6767*,6779*,7362*,7391*,8521,9573*,10842*,11208,11736*,11737*

JAUNDICE (Contd.)
   diagnosis (Contd.)
      biochemical procedures: 6409,6410,8631*,8685,9462*,9463*,9465*,10685,10687,10725,10727,10807,11733*,11738*,11739*,11777,11778,11880*
      radiology: 6620,11760
   epidemiology: 8440
   etiology: 793,820*,851,963,967,969,1651,1669,1670,1752,1807*,1852,2673,2682,2745,2746,4428,4432,4479,4485,4521,5366*,5501,6610,7385*,7475,8535*,8575,9583,9671*,10684,11736*
   kernicterus: 147*,1610*,7376*,7483,8463*,8507,10613*,10690,11956*
   neonatal: 145*,785,912*,1857,5359*,5567*,6338*,8631*,9467*,9573*,9689,9867*,11787
   obstructive: 706*,956,1670,1771*,1857,2610*,3300,3443*,3580*,3593*,4156,4378*,4427,4589*,4596,4618,5350*,5566*,5567*,5601,5602,5848*,6411,6412,6491*,6586*,6602*,6775*,7378*,7475,7476,7477,7583*,7665,7666,8440,8475*,8478*,8521,8631*,8632*,9069*,9142*,9459*,9460*,9463*,9464*,9533,9571*,9602*,9648*,9668*,6972*,10587*,10602*,10603*,10604*,10605*,10727,10807,11671*,11719*,11720*,11733*,11735*,11736*,11737*,11739*,11740*
   pathology: 9468*,9646*
   serum bile pigments: 147*,176,912*,1821*,2618*,2819,4430,4586*,5366*,5565*,6779*
   specific syndromes: 1845,5346*,7362*
      Criglar-Najjar: 9467*
      Dubin-Johnson: 719*,1618*,4425,6341*,7472*,9465*,9467*,10681,10682,10738*
      Gilbert's disease: 3636,6340*,9467*,11787
      Rotor's: 759,2809,4369*,4383*,4548*,8463*,8517,8469*,9460*,9467*
      Zieve's: 9559,10579,10683,11860,11877
   treatment: 1674,1857,6620,7666,8507,8627,8630*,9644*,10594*,10842*,11736*
JEJUNUM (see also Absorption; Enteritis, Regional; Intestine, Small): 7*,34,458,484*,864*,1013*,1026*,1380*,1477*,1908*,1922,1942*,1952*,1979*,2019*,2361*,2389,2395,2898*,3174*,3235*,3240,3242,3329,3642*,3668*,3669*,3699*,4070,4118*,4143,4238,4629*,4632*,4684*,4693,4737*,5109,5114,5200*,5241*,5673*,6058,6063,6108*,6111*,6113*,6114*,6118*,6133,6218,6644*,7118*,7120*,7148,7203,7205*,7755*,7760*,7761*,7888*,8167*,8238*,8239*,8240*,8241*,8246*,8252,8264,8267,8518,8648,8718*,8730,8807*,8902*,8954*,9084*,9090*,9140*,9143*,9180,9192,9194,9195,9258*,9262*,9272,9284,9407*,9720*,9741*,9748*,9752*,9753*,9754*,9838*,9839*,9843*,9844*,10070,10150*,10259*,10273*,10286,10310,10381,10399*,10401*,10406*,10411*,10414,10936*,10953*,10955*,11068*,11399*,11414,11422,11514*,11516*,11517*,11527,11619

KININS (see also Bradykinin): 418*,1257,2022*,2031,3662,3789,3790,4652,5630*,7883*,8689*,8718*,10925

- KWASHIORKOR: 322,1380*,2583*,3235*,3926,5929, 8037*,8057,8956,10072,11520*,11788

- LACTASE (see Intestine, Small, disaccharidase)
- LAXATIVES: 40*,1156*,1207,3854,4838*,7705*, 9291*
- LEPTOSPIROSIS: 237,6399,8485
- LIPASE (see Pancreas, secretion)
- LIPIDS (see also under Absorption; Liver, metabolism, lipid): 18,484*,958,971,978*, 1018*,1757*,1988*,2910,2913*,3381*,3654,3664*, 3672*,3693*,3948,4217*,4225*,4350*,4544*, 4586*,4660,4661,4707*,5106*,5555*,5579*,6148*, 6149*.6150*,6422,6641,6736*,6789,6805,6816, 6817,6846*,6976,6986,7124*,7316*,7346,7392*, 7783*,7878,7947,7953,7977,8617*,8795,9273, 9411*,9414*,9511,9581,9609*,9610*,9645*, 9657,9748*,9779*,9844*,9933,10406*,10408*, 10602*,10806,10931,11052*,11062,11155,11927*, 11957*,11980
- LIVER (see also Amebiasis; Bile; Biliary Tract; Blood Coagulation: Cholestasis; Cirrhosis; Glycogen Storage Disease; Hemosiderosis; Hepatitis; Immunology; Parasites and Parasitic Diseases; Porphyria; Schistosomiasis; Sulfobromophthalein; Vitamins, folic acid): 2092,8489,8671,9438*,9578*,9675*,9897,10083, 10642,10653
  - aging: 1105*,2666,2978*,2992,2999,3800*, 3812*,4493,4806,5385*,7930*,9858*,9880, 9927,11122,11128,11129,11774
  - alcohol: 160*,713*,714*,728*,806*,1095*,1126, 1927*,1943*,2080,2639*,2645,2670,2682, 2996,2987,3016,3462,3508*,3511*,5346*, 5347*,5479*,6350*,6351*,6352*,6414,6456*, 6457*,6458*,6459*,6579,6769*,6787,6818, 7499*,7501*,7502*,7514*,8473*,8511,8541*, 8554,8555,8834,8862,9447*,9469*,9576*, 9582,9597*,9649*,9861*,9878,10089*,10598*, 10606*,10638,10651,10677,10732,10752,10828*, 10844*,10991*,11782,11847*,11853*,11860, 11871,11875,11877,11878
  - ammonia: 161*,1608*,1729*,1800*,2095,2225, 2631*,2976*,2985*,3432*,3530,3587,3816, 3916*,4386*,4470,4552,4737*,5791*,6335*, 6384,6385,8468*,8482,8498,9483*,9602*, 10089*,10656,11559,11728*,11757*
  - anomalies: 2341,4446,5361*,5425,6650,6651, 9473*
  - associated diseases: 709*,734,760,798,1035*, 1611*,1612*,1658,1659,1661,1666,1797*, 1930,2062,2536*,2550,2642,2644,2648, 2650,2661,2675,2679,2692,2697,2732,2748, 3418*,3429*,3455,3457,3459,3466,3475, 3476,3478,3479,3538,4389*,4413,4414,4415, 4416,4419,4420,4423,4424,5051,5136*,5293*, 5367*,5380*,5409,5412,5415,5416,5492, 6285*,6336*,6347*,6349*,6351*,6377,6382, 6385,6396,6407,6430,6572*,6593*,6605, 6628,7377*,7386*,7397*,7423,7441,7446, 7451,7454,7463,7464,7468,7547,8227, 8472*,8490,8508,8526,8621,9082*,9434*, 9496*,9528,9535,9608*,10593*,10651,10652, 10654.10655,10665,10692,10720,10752,10776,

- LIVER, associated diseases (Contd.): 10844*, 10845*,11460,11655,11788,11803,11806,11821, 11968
  - biochemistry
    - chemical composition: 3672*,3792*,3815, 6797,6806,6813,6946,7364*,7983,8828*, 9464,9547,9581,10659,10673,10706,11109
    - enzymes: 2977*,11109
    - molecular structure: 7968,7982
  - carcinogenesis: 168,184,724*,808*,827,845, 1748,1751,2698,2734,2744,3444*,3485,3529, 4455*,4457*,4461*,4462*,4472,4475,4480, 4486,4490,4793,5024*,5354*,5481,5483, 5484,5485,5492,6470*,6478,7430,7524*, 7528,7543,7545,7554,8480*,8548,8549,8550, 8551,8582,9568*,10671,10739*,10770,10771, 10775,10777,10778,10779,10780,10781,10783 11146,11865,11871,11872,11874
  - children: 1121,1602*,1620*,1705,1717,1720 1965,2067*,2664,2671,2699,3455,3482,3814* 4437,4450,5395,5439,5450,6378,6652,6802, 7332,7407,7423,7427,7452,7458,7460,7507*, 7541,7630,7730,9449*,9503,10611*,10644, 10655,10668,10670,10703,10724,10727,11127 11131,11132,11725*,11788,11878
  - circulation: 36,142*,154*,161*,193,727*,746 754,766,794,795,796,800,811*,818*,981*, 986,1005,1098*,1110*,1149,1608*,1622*,162 1639*,1648,1662,1673,1674,1675,1700,1715, 1743*,1758*,1933,1953*,2041*,2047*,2048*, 2049*,2362*,2611*,2613*,2615*,2619*,2620* 2626*,2635*,2637*,2684,2685,2688,2852*, 2974*,2981*,2986*,2987*,3414*,3419*,3433* 3448,3463,3491,3500*,3584,3648*,3674, 3675,3676,3850*,4376*,4381*,4388*,4391*, 4395*,4399*,4433,4779*,4780*,5343*,5348*, 5351*,5357*,5373*,5375*,5380*,5410,5412, 5413,5996*,6336*,6343*,6344*,6353*,6358*, 6362*,6363*,6364*,6366*,6369*,6372*,6398, 6440,6445,6447,6448,6455*,6472,6477,6599* 6650,6774*,6781*,7366*,7373*,7374*,7380*, 7384*,7398*,7404,7412,7420,7456,7461, 7466,7470,7475,7500*,7504*,7515*,7539, 7609*,7629,7665,7923,7926*,8462*,8471*, 8495,8496,8497,8499,8500,8501,8526,8615*, 8622,8686,8709*,8899,9439*,9444*,9447*, 9469*,9470*,9471*,9475*,9476*,9477*,9478* 9481*,9484*,9486*,9487*,9492*,9520,9521, 9522,9528,9545,9651*,9656,9718*,9939*, 10596*,10601*,10617*,10623*,10624*,10630* 10631*,10700,10702,10717,10830*,10917*, 11089*,11155,11721*,11724*,11744*,11747*, 11756*,11797,11805,11811,11813,11834,1185
  - clinical studies: 6442,6477,6485,7436,7479, 7486,7488,7489
  - coma: 161,771,898,2619*,2631*,2641,2668, 3432*,3435*,3440*,3452,3459,3530,3573*, 4386*,4401,4454,4534,4551*,4552*,4557*, 5364*,5379*,5420,6335*,6383,6384,6385, 6386,6424,6582,7377*,7387*,7436,7437,7438 7608*,7611*,7619*,7623*,8462*,8481*,8482* 8483*,8502,8503,8583*,9449*,9467*,9480*, 9483*,9498*,9512,9513,9515,9644*,9645*, 9648*,10619*,10620*,10664,10666,10667, 10828*,11719*,11728*,11806

ER (Contd.)
development: 149*,150*,182,194,834,1116,1132,
1931,2054*,2067,2071,2082,2986*,3021,3674,
3801*,3802*,3827,3839,3840,4473,4673,4800,
4809,4823,5829,5832,6454*,6799,6806,6815,
6819,6827,7728,7729,7925*,7959,8539*,8561,
8710*,8872,8893,8895,9265*,9581,9634,9898,
9926,9930,10946,10947,11124,11125,11126,
11856*,11878
diagnosis: 738,748,749,755,772,774,895,899,
1612*,1638*,1699,1840,2628*,2652,2710,
3041,3440*,3452,3468,4372*,4384*,4396*,
4433,4514,4611,5381*,5384*,5433,5441,5446,
6183,6331*,6369*,6384,6402,6433,7406,
7425,7442,8503,8525,8607,9450*,9471*,9523,
9546,10597*,10640,10641,10679,10689,10727,
11783,11797
biochemical procedures: 6394,6783,6804,
6813,6826,7426,7434,7439,7458,7542,
7565*,7569*,7590,7930*,7971,8475*,8513,
8538*,8834,8858,8859,8860,8885,8890,
8900,9280,9431*,9432*,9433*,9457*,
9459*,9541,9547,9603*,9607*,9637*,9641*,
9863*,9867*,9879,9896,9909,10605*,
10675,10721,10723,10793*,10847,10848,
10849,10851,11098*,11100*,11104*,11110,
11112,11726*,11730*,11742*,11762,11809,
11834
biopsy: 706*,757,1607*,1625*,1632*,1695,
1697,1701,1718,1927*,2463,2550,2663,
2674,2678,2687,2730*,2757*,3428*,3446,
3447,3453,3464,3466,3522,4440,4529,
4548*,5293*,5344*,5355*,5374*, 5385*,
5388,5401,5406,5407,5437,5438,5561,
5844*,6332*,6341*,6346*,6351*,6396,
6431,6432,6536,7362*,7364*,7373*,7398*,
7444,7453,7509*,8463*,8465*,8474*,8478*,
8911,8912,9265*,9432*,9454*,9496*,9552,
9553,9561,9599*,9607*,9642*,9643*,9646*,
10089*,10593*,10600*,10608*,10612*,
10618*,10716,10720,10736,10738*,10800*,
10840*,11213,11728*,11732*,11736*,
11746*,11780,11781,11854*,11886*,11887*,
11925*,11974,
endoscopy: 9456*,10830*,11842
function tests: 145*,707*,723*,801,803,
843,1605*,1607*,1609*,1696,1715,1720,
1732*,1758*,2625*,2628*,2653,2658,2660,
2677,2723*,2998,2999,3418*,3633,4378*,
4383*,4389*,4404,4421,4533,4536,4557*,4787*,
5051,5136*,5358*,5371*,5382*,5429,5430.
5431,5432,5612,6326*,6327*,6361*,6400,
6404,6409,6410,6411,6416,6475,6492,
6522,6578,6586*,6598*,6605,6767*,7359*,
7363*,7370*,7381*,7393*,7395*,7396*,7397*,
7398*,7399*,7448,7449,7450,7451,7452,
7454,7456,7457,7464,7503*,7530,7533,
7546,7549,7601,7604,7625,7653,7757*,
7940*,8040*,8228,8466*,8472*,8490,8509,
8510,8528,8529,8530,8531,8571,8581,
8585*,8685,8825*,8836,8838,9438*,9455*,
9458*,9459*,9460*,9461*,9462*,9463*,
9468*,9480*,9551,9554,9555,9556,9557,
9570*,9592,9595,9597*,9600*,9606*,9608*,
9636*,9641*,9644*,9675*,9676*,9861*,
9872*,9894,9916,9917,10089*,10348,

LIVER, diagnosis, function tests (Contd.):
10593*,10596*,10651,10661,10723,10724,10726,
10839*,11091*,11097*,11098*,11644*,11729*,
11734*,11735*,11737*,11739*,11746*,11748*,
11749*,11750*,11757*,11771,11772,11774,11775,
11776,11779,11780,11784,11826,11850*,11854*,
11855*,11873,11879*,11883*,11886*,11934*,
11968,11969,
radiology: 204*,727*,731,732,733,744,751,
753,1111*,1180,1603*,1702,1712,1716,
2621*,2677,2696,2722*,3055,3514*,3845*,
3850*,3865,4382*,4388*,4394*,4398*,
4436,4444,4445,4446,4447,5356*,5374*,
5377*,5378*,5402,5424,5440,5443,5444,
5446,5467*,6343*,6387,6389,6391,6392,
6429,6447,6783,7382*,7412,7427,7428,
7433,7446,7447,7459,7481,7653,7971,
8494,8510,8526,8532,8560,8897,9292*,
9454*,9485*,9549,9554,9601*,9907,10624*,
10710,10733,10734,10735,10772,11089*,
11725*,11745*,11761,11762,11763,11764,
11765,11766,11838,11840,11841,11852*
angiography: 1698,1703,4370*,4446,5439,
5442,5552*,6365*,6367*,6390,7388*,7424,
8527,9456*,9550,10596*,10601*,11759
lymphography: 5445,7455,7539
serum enzymes (see also Phosphatase,
alkaline): 199,214,720*,728*,736,773,
787,829,865*,867*,948,1600*,1602*,1606*,
1650,1704,1763*,1765*,1767*,1768*,1777,
1808*,2610*,2628*,2651,2654,2660,2686,
2687,2727*,2751*,2767,2778*,3008,3412*,
3415*,3437*,3443*,3449,3450,3472,3505*,
3534,3544*,3555,3557,3591*,3596*,3608,
4401,4414,4418,4422,4460*,4498*,4502*,
4517,4522,4529,4545*,4546*,4557*,5344*,
5349*,5350*,5382*,5434,5435,5436,5532,
5550*,5562,6325*,6329*,6330*,6336*,
6350*,6354*,6361*,6397,6408,6421,6435,
6437,6438,6439,6456*,6465*,6466*,6467*,
6487*,6491*,6492*,6560,6601*,6795,6990,
7324,7332,7379*,7385*,7387*,7393*,7394*,
7396*,7398*,7400*,7443,7460,7508*,7509*,
7548,7559*,7560*,7568*,7571*,7572*,
7579*,7586*,7589*,7599,7611*,7619*,
7693,7933*,8103,8466*,8478*,8519,8520,
8534,8540*,8552,8554,8565,8583*,8585*,
8587*,8588*,8608,8846,8858,9455*,9457*,
9479*,9498*,9558,9570*,9597*,9600*,
9604*,9606*,9609*,9613*,9631,9640*,
9641*,9643*,9644*,9645*,9647*,9665*,
10587*,10596*,10604*,10606*,10635*,
10680,10685,10688,10728,10730,10731,
10732,10737*,10757,10787*,10832*,
10934,11091*,11100*,11719*,11723*,
11728*,11737*,11750*,11756*,11767,11768,
11769,11793,11844*,11854*,11886*,11937
diseases: 709*,720*,729,736,737,746,749,
751,776,777,780,895,1623*,1644,1650,1657,
1667,1672,1673,1699,1700,1706,1748,1749,
1751,1820*,2638*,2639*,2645,2650,2655,2657,
2662,2675,2705,2709,2788,3419*,3437*,
3468,3474,3637,3910*,4381*,4387*,4431,
4433,5345*,5367*,5387,5389,5417,5418,5426,
5433,5575*,5605,5861,5922,5927,5957,6183,
6332*,6350*,6378,6382,6398.6407,6415,6417,

- LIVER, diseases (Contd.): 6419,6425,6442,6575,6628,7358*,7439,7440,7441,7443,7444,7445,7456,7462,7482,7498*,8094,8410,8484,8491,8534,8675,9289,9534,9543,9557,9562,9565,10610*,10639,10643,10644,10645,10646,10650,10663,10683,10685,10712,10721,10723,10727,10729,10733,10846,11730*,11734*,11770,11790,11793,11803,11809,11820,11960
    - abscess: 758,798,1705,1709,1717,2707,3085*,3481,4378*,5377*,6401,6402,6403,6404,7377*,7404,7407,7459,8461*,9003,9450*,9542,10615*,10661,11726*
    - cyst: 740,745,781,1708,1710,1716,2704,2706,3492,4396*,5391,5392,5393,5396,6334*,6875,7405,7406,7408,9497*,9505,9668*,10662,11736*,11766,11839,11840
    - hepatomegaly: 844,1617*,1797*,2627*,2664,3228*,3422*,3439*,4380*,4411,4557*,5367*,5388,5493,6351*,6433,7505*,7570*,8911,8912,9493*,9513,10343*,10596*,10606*,10791*,10844*
    - pathology: 724*,1631*,1668,1671,2665,3421*,3484,3493,4368*,4390*,4423,5365*,5390,5468*,6400,6518,7626,7627,7752,8474*,8488,8492,8496,8523,8552,8575,8601,8610,8615*,8620*,8667,8668,8669,9434*,9447*,9474*,9508,9518,9535,9544,9548,9558,9569*,9575*,9577*,9584,9596*,9597*,9644*,9648*,9651*,9652*,9658,9668*,9675*,9721*,9999*,10588*,10593*,10637,10652,10654,10656,10658,10659,10660,10664,10667,10700,10701,10702,10705,10715,10716,10722,10738*,10739*,10741*,10753,10757,10796*,10800*,10801*,10828*,10829*,10831*,10850,10851,10991*,11705*,11721*,11727*,11731*,11744*,11769,11785,11786,11839,11845*,11851*,11853*,11870,11877,11886*,11887*,11936*,11943
    - treatment: 725*,730,743,769,1624*,1626*,1640,1641,1643,1647,1664,1665,1709,1710,1717,1719,1734*,2220,2640,2666,2689,2690 3456,3901,4415,4454,5447,5448,5449,5450,5451,5452,5453,5454,5455,5456,5457,5458,5459,5460,5461,5474*,5606,6384,6402,6450,6451,6452,6453,6576,6581,6582,6583,6896,7406,7478,7485,7486,7487,7488,7490,7491,7492,7493,7496,7535,7628,7662,7663,8483*,8502,8503,8542*,9431*,9432*,9480*,9482*,9497*,9498*,9503,9506,9512,9536,9537,9539,9540,9542,9587,9686*,9977,10594*,10619*,10620*,10635*,10640,10641,10657,10662,10707,10708,10709,10710,10711,10713,10714,10758,10825,10828*,10834*,10852,11721*,11728*,11732*,11783,11818,11821,11822,11823,11824,11825,11827,11836,11837,11839,11847*,11850*,11851*,11865,11875
- enzymes
    - parenchymal: 6*,138*,148*,159*,160*,172,175,177,182,194,195,197,706*,838,845,899,900,904,1107*,1112*,1117,1120,1121,1128,1129,1144,1145,1147,1151,1152,1155*,1740*,1741*,1901*,2033*,2057,2061,2062,2067,2071,2074,2078,2080,2081,2082,2083,2084,2094,2095,2098,2099,2627*,

- LIVER, enzymes, parenchymal (Contd.): 2730*,2742,2767,2977*,2978*,2992,2993,2994,3001,3003,3004,3008,3010,3019,3021,3025,3228*,3417*,3447,3449,3450,3454,3472,3506*,3518*,3535,3800*,3804*,3812*,3813*,3817,3819,3821,3822,3824,3825,3837,3840,3842,4057*,4493,4548*,4555*,4562,4790*,4807,4811,4813,4824,5406,5407,5475*,5478*,5500,5507,5798*,5803*,5805*,5818,5821,5827,5830,5831,5833,5917,6324*,6360*,6436,6468*,6477,6523,6536,6584,6786,6787,6790,6793,6794,6802,6806,6808,6829,7324,7360*,7371*,7381*,7387*,7395*,7423,7458,7460,7507*,7508*,7509*,7517*,7520*,7541,7542,7550,7551,7553,7589*,7599,7607*,7928*,7930*,7933*,7939*,7943,7968,7969,7970,8465*,8466*,8468*,8473*,8515,8541*,8546*,8548,8549,8551,8552,8554,8555,8558,8565,8583*,8620*,8830*,8831*,8833*,8834,8845,8846,8847,8851,8852,8856,8858,8859,8860,8861,8864,8867,8868,8880,8890,8891,8892,8893,8895,8900,9265*,9280,9455*,9507,9571*,9573*,9578*,9588*,9590,9608*,9616*,9639*,9643*,9650*,9860*,9862*,9874*,9875*,9882,9883,9886,9887,9895,9899,9900,9905,9912,9915,9919,9920,9928,9930,10605*,10729,10730,10732,10744,10746,10748,10755,10757,10768,10934,11091*,11100*,11102*,11103*,11107*,11116,11117,11118,11123,11124,11125,11126,11129,11130,11131,11140,11142,11149,11732*,11737*,11740*,11748*,11754*,11758*,11844*,11849*,11874
    - epidemiology: 11783
    - extracts: 9896,10592*
    - fatty: 714*,793,806*,815*,1602*,1626*,1723*,1736*,1746*,2550,2628*,2663,2973*,3411*,3421*,3435*,3462,3470,3508*,4328*,4329*,4409,4781*,4787*,4789*,5364*,5384*,5421,5447,5456,5468*,5476*,5577*,5578*,5785*,5788*,5805*,6326*,6331*,6346*,6349*,6350*,6351*,6352*,6356*,6417,6457*,6459*,7363*,7400*,7419,7502*,7504*,7505*,7506*,7562*,7775*,7953,7954,8473*,8476*,8511,8512,8541*,8545*,9447*,9448*,9449*,9468*,9492*,9513,9523,9576*,9577*,9580,9647*,10089*,10593*,10598*,10657,10676,10677,10678,10740*,10743*,10752,10844*,11746*,11748*,11749*,11847*,11848*,11850*,11853*,11859*
    - fistula: 986
    - hormonal control: 3800*,3817,3833,3834,3835,3836,3839,4397*,4463*,4475,4480,5354*,5360*,4798,4826,5727,5784*,5804*,5805*,5815,5819,5830,6791,6794,6795,6822,6834,7631,7928*,7929*,7932*,7936*,7941*,7955,7964,7969,7973,8472*,8509,8837,8861,8870,8874,8894,9466*,9475*,9578*,9637*,9875*,9905,10669,10740*,10745,10831*,10833*,10841*,11087*,11094*,11095*,11113,11141,11144,11145,11152,11153,11154,11865,11925*
    - immunology: 143*,749,755,1099*,1604*,2042*,2072*,2088*,2091*,2614*,2723*,2728*,2757*,2758*,3017,3437*,3507*,3517*,3809*,3827,3828,3832,4368*,4441,4442,4496*,4497*,5365*,5381*,5384*,5386*,5482,5483,5808,5957,6328*,6333*,6356*,6451,6463*,7356*,

- LIVER, immunology (Contd.): 7357*,7386*,7405, 7429,7439,7440,7441,7442,7451,7511*,7521*, 7556*,7925*,7964,8460*,8480*,8601,8885, 9441*,9445*,9450*,9451*,9452*,9453*,9502, 9541,9570*,9603*,9604*,9632,9633,9661,9870*, 9903,10635*,10684,10706,10739*,10773, 10784,10800*,10802*,11099*,11115,11731*, 11751*,11810,11832,11923,11929*,11930*
  - injury: 410*,829,858,1722,1745*,1782,2723*, 2728*,3507*,3516*,3517*,3521,3522, 3678,4452,4468,4471,4540,5472*,5477* 6477,6605,7459,7470,7521*,8504,10750,10758, 11855*,11911
    - dietary deficiencies: 808*,810*,812*, 817*,1109*,1808*,4459*,4473,4553* 4788*,5564,7498*,7511*,7522*,8836, 9568*,9860*,9879,10614*,10740*,10756, 10757,11108*,11846*,11848*,11850*, 11859*
    - radiation: 166,828,834,1790,2076,2100, 2700,3498*,3514*,3527,3528,3539,4466, 4467,4469,4470,4493,4494,4812,4827, 5467*,5488,5489,5491,6472,6473,6474, 6802,7517*,8557,8558,8559,8560,8561, 8562,8563,9581,9585,10744,10745,10746, 10747,10748,10749,11745*,11867
    - toxic agents: 211*,806*,807*,809*,813*, 817*,819*,820*,822,823,824,825,826, 830,831,832,833,837,840,841,844,846, 850,851,852,853,854,855,856,1096,1107*, 1114*,1138,1726*,1727*,1728*,1729*, 1731*,1733*,1735*,1736*,1741*,1742*, 1744*,1750,1752,1807*,2658,2718*,2724*, 2726*,2729*,2730*,2735,2737,2738,2739, 2740,2743,2746,2748,2749,2977*,3014, 3496*,3497*,3499*,3501*,3502*,3503*, 3504*,3506*,3510*,3511*,3513*,3515*, 3518*,3520,3523,3525,3526,3529,3531, 3532,3536,3537,3538,3542*,4456*,4457*, 4461*,4464*,4476,4477,4478,4479,4482, 4483,4485,4486,4487,4488,4489,4491, 4492,4530,4785*,4824,5024*,5347*,5437, 5465*,5469*,5470*,5471*,5472*,5478*, 5479*,5487,5492,5493,5494,5495,5499, 5500,5830,6325*,6326*,6454*,6456*, 6457*,6458*,6459*,6460*,6461*,6464*, 6465*,6469*,6471*,6475,7499*,7500*,7501*, 7502*,7503*,7506*,7507*,7508*,7509*, 7510*,7512*,7514*,7524*,7526*,7527*, 7535,7537,7547,7548,8460*,8544*,8550, 8553,8571,8572,8573,8574,8575,8576, 9570*,9583,9586,9591,9593,9594,9676*, 10590*,10741*,10751,10752,10753,10759, 10761,10762,10763,10764,11860,11864, 11876
      - aflatoxin: 5462*,5463*,5464*,7513*, 8539*,10760
      - anesthetics: 818*,835,836,842,843,857, 1726*,1747*,2741,2742,3511*,3524, 3534,4474,4484,4495,5475*,5498,6480,6484, 6485,7505*,7506*,7534,7544,8577,9572*, 9575*,9590,9591,9595,10620*,10754, 10755,11861,11862,11863
      - antibiotics: 839,1122,2720*,2736,2747, 5476*,5486,6466*,6467*,6468*,7525*,

- LIVER, injury, toxic agents, antibiotics (Contd.): 8476*,8545*,9573*,9577*,9580,9584,11845*,11858*
      - CCl_4: 809*,811*,814*,816*,821*,838, 847,848,849,1109*,1729*,1733*,1734*, 1736*,1737*,1738*,1739*,1740*,1743*, 1801*,2719*,2722*,2725*,2727*,3500*, 3505*,3519,3533,4393*,4397*,4458*, 4460*,4463*,4544*,4550*,4562,4786*, 5466*,5473*,5474*,5477*,5490,5491, 6455*,6463*,7400*,7504*,7505*,7509*, 7511*,7512*,7515*,7516*,7518*,7520*, 7531,7532,7540,7551,8536*,8538*, 8542*,8543*,8545*,8546*,8564,8565, 8566,8567,8568,8569,8570,8617*, 9569*,9571*,9574*,9592,9650*, 10737*,10743*,10765,10766,10767, 10768,10769,10845*,10991*,11844*, 11847*,11851*,11852*,11853*,11854*, 11936*
      - contraceptives: 2745,3509*,3512*, 3515*,5496,5497,5498,7519*,7523*, 8540*,11873
      - ethionine: 807*,815*,819*,1134,1723*, 1746*,2721*,2744,2891*,3411*,3519, 3535,3795*,4462*,4675*,4789*,5481, 6462*,6470*,7550,7551,7588*,8537*, 8545*,8828,11851*,11853*,11854*,11856*
  - metabolism: 138*,186,201,1101*,1103*,1114*, 1119,1127.1135,1610*,1639*,1748,1749,1751 1943*,2085,2093,2659,2662,3651,3818,3826, 3829,3834,3844,4416,4443,4471,4808,5817, 6464*,6483,6774*,6781*,6790,6798,6810, 6828,6833,7372*,7462,7467,7474,7607*, 7970,8572,8827*,8832*,8835,8841,8850, 8861,8863,8870,9083*,9476*,9508,9524, 9802*,9867*,9913,9922,10087,10616*,10658, 11092*,11101*,11111,11114,11120,11121, 11140,11143,11789,11828,11843,11861, 11868,11869
    - carbohydrate: 162*,170,188,192,200,1095*, 1142,1143,1724*,1744*,2069,2083,2084, 2098,2636*,2799*,2973*,2996,2997, 3005,3012,3013,3014,3462,3465,3518*, 3796*,3797*,3800*,3804*,3814*,3841, 3843,4798,4801,4805,4807,4812,5415, 5760*,5801*,5819,5824,5827,5840,6416, 6494*,6521,6788,6822,6823,6827,6976, 7361*,7363*,7364*,7381*,7399*,7423, 7465,7700*,7711*,7928*,7941*,7942, 7943,7969,8040*,8563,8623,8862,8889, 8891,8892,8893,9134,9473*,9567*,9572*, 9573*,9587,9654,9906,9924,10144*, 10609*,10610*,10611*,10652,10656,10744, 10745,10767,11001,11102*,11107*,11151, 11152,11153,11155,11717,11722*,11754*, 11790,11804,11856*,11885*,11926*
    - cholesterol and steroid: 152*,169,173, 179,181,187,203,916*,1102*,1118,1128, 1129,1131,1140,1150,1723*,2096,2634*,2991, 3011,3792*,3806*,3838,4465,4492,4784*, 4789*,4792,4816,4817,4818,4822,5787*, 5809,6771*,6793,6807,6811,6812,6821, 6831,6832,6836,7217*,7675,7931*,7949, 7955,7956,7957,7958,8346,8579,8605, 8824*,8839,8842,8844,8886,8892,9287,

- LIVER, metabolism, cholesterol and steroid (Contd.): 9464*,9466*,9587,9610,9871*,9890,9898,9908,9914,9923,9932,10672,10708,10742*,11083*,11084*,11087*,11104*,11123,11136,11144,11145,11153,11154,11155,11740*,11823,11885*,11957*
  - drug: 167,168,1050*,1725*,1730*,2043*,2066,2982*,2989*,2990*,2995,3015,3794*,4456*,4793,4810,5825,6465*,6478,6482,6712*,6808,6818,6830,6834,7478,7479,7488,7489,7492,7528,7529,7533,7538,7540,7541,7542,7543,7545,7546,7548,7549,7551,7553,7554,7555,7602,7628,7937*,7938*,7939*,7943,7944,7945,7949,8040*,8496,8548,8550,8551,8558,8566,8580,8582,8743,8824*,8830*,8838,8845,8847,8848,8851,8853,8854,8857,8859,8860,8868,8883,8887,8894,9448*,9536,9583,9589,9862*,9870*,9872*,9876,9878,9882,9883,9884,9888,9889,9894,9899,9900,9901,9902,9912,9916,9917,9921,10669,10712,10737*,10751,10752,10753,10754,10759,10760,10761,10762,10770,10772,10773,10774,10775,10777,10778,10779,10782,10783,10785,11088*,11091*,11093*,11104*,11138,11139,11146,11147,11148,11149,11150,11752*,11827,11847*,11849*,11853*,11858*,11865,11871,11874,11876
- iron: 153*,3480,3502*,3504*,3560,3590,5345*,6818,7482,7493,8831*,8885,9279,9496*,9721*,9863*,10569*,10614*,10649
- lipid: 149*,151*,155*,194,198,714*,722*,828,1100*,1102*,1108*,1116,1125,1126,1143,1623*,1723*,1746*,1927*,2039*,2060,2070,2076,2077,2086,2098,2786*,2891*,2985*,2987*,3006,3016,3018,3020,3672*,3811*,3837,3838,3839,3948,4328*,4553*,4687*,4781*,4797,4800,4802,4803,4804,4821,4822,4829,5351*,5474*,5476*,5555*,5786*,5789*,5796*,5828,5831,5839,6331*,6417,6458*,6461*,6473,6474,6773*,6777*,6785,6789,6817,6823,6824,6976,7518*,7522*,7582*,7615*,7941*,7946,7947,7948,7949,7950,7951,7952,7954,8536*,8569,8637*,8842,8876,8877,9447*,9448*,9464*,9576*,9581*,9865*,9869*,9879,9919,9920,10598*,10657,10672,10756,10743*,10749,11086*,11094*,11102*,11151,11152,11153,11717,11722*,11723*,11738*,11782,11790,11846*,11850*,11856*
- nucleic acid: 166,184,1124,1134,1146,1148,1965,2058,2073,2087,2721*,2993,3801*,3802*,3823,4477,4494,4796,4814,4815,4830,5485,5499,5791*,5792*,5820,5834,5836,6482,6653,6799,6804,6815,6819,7513*,7522*,7524*,7526*,7553 7932*,7934*,7935*,7959,7961,8871,8873,8874,8875,8878,8880,8896,9873*,9874*,9876,9887,9911,9926,9927,10664,10674,10747,10769,10774,10780,10782,11095*,11118,11127,11132,11845*,11850*,11872

LIVER (Contd.)
- metabolism (Contd.)
  - phospholipid: 165*,172,10674,11875
  - protein: 166,175,178,185,190,191,195,196,856,1132,1136,2013,2014,2060,2091,2733,2772,2837*,2967*,2972*,2973*,2978*,3017,3574*,3587*,3764*,3798*,3815,3820,3832,3833,4161*,4466,4788*,4794,4809,4813,5367*,5462*,5485,5788*,5790*,5791*,5797*,5804*,5814,5838,6347*,6385,6460*,6461*,6492*,6571*,6785,6786,6792,6795,6819,6896,6949,7381*,7457,7460,7487,7490,7491,7510*,7522*,7927*,7929*,7959,7961,7981,8512,8513,8836,8837,8874,8882,8889,9289,9499*,9507,9586,9866*,9892,9907,9915,10628*,10751,10754,10777,11102*,11108*,11781,11822,11845*
  - purine and pyrimidine: 3001,3822,5822,6780*,6825,7945,9878,9906,11126
  - trace elements: 814*,905,1115,1130,1133,1142,1953*,2655,2722*,2732,3835,3836,4549*,5347*,5385*,5422,5423,5468*,5530,5551*,6381,6414,6540,7435,8569,9911,10599*,10667,10673,10722,11822,11823,11846*,11852*
    - aluminum: 9925
    - copper: 5799*,5818,5838,7389*,7741*,9432 9925
    - iron: 5811,5812,6337*,6470*,6565*,6586*,6662*,7778*
    - magnesium: 6337*,9925
    - titanium: 9925
    - tungsten: 7564*
    - zinc: 7520*,11936*
- microorganisms: 3442*,4389*,5355*,6334*,7377*
- morphology: ,26*,36,141*,150*,163*,180,189,766,772,830,1005,1011,1098*,1114*,1628*,1629*,1727*,1927*,1930,1931,1932,1933,2069,2611*,2665,2674,2740,2852*,2975*,3001,3009,3022,3464,3672*,3674,3676,3677,3678,4393*,4668*,4673,4805,4826,4827,5380*,5648*,5649*,5783*,5792*,5805*,5808,5813,5823,5828,6344*,6377,6396,6399,6430,6472,6485,6650,6651,6652,6653,6654,6773*,6796,6798,6803,6806,6833,7372*,7373*,7374*,7380*,7468,7472,7526*,7529,7543,7545,7554,7726*,7729,7730,7731,7955,7959,7962,7972,7975,8463*,8488,8537*,8557,8559,8561,8564,8577,8579,8630*,8709*,8710*,8828*,8832*,8838,8840,8869,8879,8882,8896,9446*,9468*,9481*,9487*,9491*,9547,9569*,9585*,9642*,9740,9858*,9859*,9866*,9873*,9874*,9891,9909,9910,9913,10616*,10617*,10649,10655,10705,10760,10938*,10945,10946,10948,11096*,11106*,11664,11828,11829,11862,11873
- neoplasms: 1694,1702,4437,4440,6387,7424,7425,7426,7432,7433,9543,9885,9905,10061,10674,10689
  - benign: 1690,1721,2699,5347*,6395,9503,11751*
  - malignant: 1691,1692,1693,1695,1814,2063 2695,2696,2697,2700,2701,2702,2703,3081*,3444*,3482,3483,3484,3485,3486,3487,4245*,4372*,4385*,4396*,

LIVER, neoplasm, malignant (Contd.): 4435,4436,4438,4439,4455*,5349*,5351*,5354*,5360*,5370*,5374*,5381*,5401,5402,5403,5404,5405,5406,5407,5408,5482,6325*,6326*,6345*,6346*,6348*,6379,6388,6389,6390,6391,6392,6393,6394,6653,7420,7421,7427,7428,7429,7430,7431,7530,7572*,8034*,8470*,8480*,8497,8513,8514,8515,8516,8620*,9436*,9437*,9450*,9454*,9456*,9462*,9469*,9489*,9490*,9501,9502,9504,9506,9507,9668,9918,10596*,10597*,10607*,10647,10668,10669,10670,10671,10672,10673,10675,10684,10730,10765,10770,10784,10785,10827*,11117,11145,11220*,11632,11719*,11744*,11748*,11751*,11753*,11828,11829,11830,11831,11832,11834,11867

nervous control: 1622*,2975*,4376*,4829,7928*,7935*,8709*,9566*,9596*,10917*,11096*

psychologic factors: 11818

pathology: 1611*

perforation: 7417,7418,9489

perfusion: 139*,151*,170,1115,1136,1137,1139,1146,1621*,1634*,2060,2985*,3016,3409*,3415*,3427*,3494,3498*,3797*,3798*,3804*,3811,3812*,3813*,4784*,4785*,4801,5353*,5371*,5786*,5789*,5803*,5897*,6356*,6358*,6359*,6361*,6362*,6366*,6823,7367*,7368*,7369*,7401,7402,7403,7726*,7941*,7963,8471*,8567,8825*,8833*,8864,8865,8873,8894,9444*,9445*,9446*,9455*,9476*,9479*,9482*,9524,9572*,9864*,9866*,9868*,9869*,9870*,9871*,9929,10598*,10623*,10631*,10632*,10633*,10635*,10701,10704,10743*,10767,11091*,11106*,11151,11152,11153,11724*,11756*,11757*,11821,11992

plasma proteins: 156*,883*,887,894,908,1099*,1605*,1612*,2648,2733,2837*,2839*,3440*,3483,3574*,3577*,3809*,4422,4505*,4506,4520,4785*,5384*,5386*,5429,5433,5557,5605,6328*,6333*,6336*,6555,6801,7357*,7359*,7382*,7393*,7405,7412,7578*,7580*,7583*,7594,7720,7962,8467*,8477*,8513,8543*,8606,8607,8618*,8624,8865,9143*,9450*,9480*,9570*,9579,9661,9676*,9873*,10252,10684,10777,10793*,10840*,11089*,11090*,11095*,11105*,11156*,11726*,11728*,11730*,11731*,11748*,11751*,11756*,11757*,11809,11850*,11883*,11922,11925*,11934*,11936*,11942,11956*

regeneration: 140*,141*,143*,150*,154*,189,198,199,200,201,779,809*,1098*,1100*,1101*,1105*,1111*,1112*,1122,1124,1146,1148,1149,2034*,2040*,2041*,2046*,2050*,2058,2061,2064,2065,2076,2089,2090,2623*,2972*,2973*,2988*,2993,3000,3451,3513*,3527,3794*,3801*,3802*,3807*,3820,3828,4469,4481,4494,4550*,4779*,4780*,4795,4796,4814,4830,5362*,5424,5476*,5785*,5796*,5810,5813,5814,5820,5826,6348*,6374,6393,6440,6441,6463*,6468*,6472,6777*,6791,6796,6800,6801,6825,6826,7360*,7361*,7366*,7484,7536,7932*,7933*,7934*,7935*,7971,7972,7973,7974,7975,7976,8538*,8542*,8557,8559,8582,8630*,8826*,8831*,8878,8880,8881,8882,8883,8884,9435*,9481*,9486*,9488*,9489*,9490*,9497*,9501,9574*,9858*,9880,9881,9885,9887,

LIVER, regeneration (Contd.): 9893,9911,9918,10595*,10616*,10630*,10631*,10674,10718,10719,10747,10748,10783,10786*,11093*,11094*,11095*,11100*,11119,11120,11121,11122,11752*,11756*,11807,11808,11858*.12004

reticuloendothelial system: 262,3529,3829,4668*,4828,5467*,5480*,5790*,5811,5812,7429,7966,8886,8888,9447*,9582,9868*,10811,10825,11115,11119,11128,11833

secretion: 4482,6591*,6773*,6778*,8504,8857

toxic effects

chemical: 9567*,9588

radiation: 2977*,2988*

transplantation: 778,1099*,1615*,1633*,1634*,1635*,1636*,1637*,2609*,2613*,2614*,2621*,2629*,2635*,3415*,3420*,3483,3495,4371*,4442,4451,5372*,5373*,5426,5427,5428,6353*,6354*,6355*,6357*,6359*,6360*,6405,6406,7365*,7366*,7515*,8470*,8487,8826*,9439*,9440*,9441*,9442*,9443*,9525,10630*,10631*,10632*,10633*,10634*,10635*,10705,11757*11792

trauma: 739,763,795,2688,2731,4410,4450,6363*,9531,9560,10703

surgery: 738,739,762,766,776,777,779,780,781,782,783,784,790,800,836,1387,1628*,1648,1654,1657,1716,2088,2642,2646,2688,2695,2706,2708,2715,2788,2802*,3451,3469,3487,3489,3492,3527,3576*,3583,3596*,4412,4448,4449,5380*,5391,5393,6334*,6344*,6345*,6372*,6374,7361*,7379*,7608*,7643*,7647*,8504,9517,9534,10717

vitamin B_{12} (see also Absorption; Malabsorption; Vitamins): 1108*,7485,7486,7490,7531,7605,7954,8871,10771,11935*

LYMPH: 8*,34,158*,450,693*,1043*,2049*,2893*,2987*,3209,3249,3363,3664*,3676,3860,4102,4116,4355*,4395*,4687*,4884*,4984,5331*,5659*,5668*,5702*,6246,6472,6640,6649*,6844*,7411,7621*,7783*,7823*,8053,8195,8240*,8274,8617*,8673,8712,8965,9487*,9651*,9869*,10094*,11003

MALABSORPTION (see also Intestine, Small; Steatorrhea): 1486,1490,2468,3081*,3324,3331,4221*,4230,4240,5224,6663*,7221,8342,9273,9532,10428

associated diseases: 304,589,590,1480*,2459,3320*,4218*,4225*,5199*,5202*,5229,6202*,6210*,6217,6219,7217*,7293*,8333*,8336*,8338,8339,8343,8346,10421,10422,11518*,11526

children: 2455,6205*,6209*,6213,8339,9283,10418

diagnosis: 1471*,1474*,2453,2461,4222*,5206*,5214*,5232,8346,8348,9277,10424

biochemical procedures: 10423,10968,11065*

biopsy: 580*,582*,1477*,1478*,1479*,2444*,3318*,5201*,5207*,5213*,5216*,5241*,6114*,6207*,6218,8246*,9257*,9276,10403*,10406*,10414,10419,10524*,11514*,11516*,11517*,11536

- MALABSORPTION (Contd.)
  - diagnosis (Contd.)
    - radiology: 6214
    - tolerance tests: 1482*,2445*,2448*,2540*,3235*,3328,3330,4225*,5212*,5213*,6202*,6206*,6207*,7206*,9257*,9259*,9267*,10403*,10404*,10524*,11513*,11516*,11520*,11539,11928*
    - D-xylose: 587,1030,1480*,2443*,2452,2467,6044*,6213,7215*,7217*,8246*,9274,9276,9381*,10401*,10406*,10409*,10412*,11514*,11515*,11517*,11524*,11928*
  - epidemiology: 3311*
  - etiology: 6208*,10415,10424,11537
  - pathophysiology: 581*,2459,2464,2466,3320*,4219*,4228,4233,4236,10417,10427
    - anemia: 586,588,2278*,2458,4227,5202,5204,5207,6211*,7210*,8336*
    - disaccharidase deficiency: 582*,1472*,1478*,1482*,1487,2445*,2446*,3312*,3314*,3317*,4231,4237,4242,5200*,5201*,5205*,5212*,5216*,5219,5220,6200*,6202*,6207*,6211*,7465,8331*,8347,9257*,9267*,9288,9752*,10404*,10524*,11513*,11514*,11516*,11520*,11538
    - intolerance, sugar or milk: 583*,1472*,1473*,1481*,1488,2443*,2456,2457,2460,3314*,3321*,3323,3330,4229,4239,5027*,5155*,5205*,5209*,5217*,6200*,6202*,6207*,6209*,7205*,7206*,7225,9256*,9257*,9259*,9261*,9265*,9266*,9267*,9268*,9280,9281,9282,9283,10403*,11516*,11525,11538,11539
    - microorganisms: 573*,578*,5209*,9270*,10410*,10425
    - steatorrhea (see also Steatorrhea):575*,580*,581*,1474*,1477*,1483*,2461,2467,4217*,4222*,4225*,4226,5199*,5203*,5213*,5225,5230,5546*,6201*,6204*,6210*,7209*,7218*,7222,8333*,10405*,10406*,11514*,11515,11517
    - vitamin deficiencies: 2278*,2280*,2458,4224*,5203*,5204*,5208*,5227,7216*,7816*,8179*,8339,9118,9276
  - primary
    - celiac disease: 495,576*,579*,584,585,1473*,1476*,1479*,1485,2360*,3315*,3316*,3317*,3318*,3319*,3333,4217*,4219*,4229,4239,4699*,5201*,5206*,5207*,5212*,5215*,5216*,5218*,5760*,6114*,6203*,6207*,6210*,7207*,7209*,7213*,7223,7891*,8333*,8336*,8337*,9143*,9258*,9261*,9262*,9266*,9268*,9272,10408*,10418,10419,10420,10421,11013*,11065*,11515*,11524*,11536,11537
    - miscellaneous: 4220*,4223*
    - sprue: 574*,575*,582*,592,1479*,1480*,1485,2465,5208*,5211*,5215*,5218*,6208*,6211*,6219,78[illegible]9*,8334*,9262*,10417,11531
    - tropical sprue: 577*,578*,2446*,2447*,2449*,2450*,5208*,5210*,5213*,5215*,5221,6114*,7213*,8246*,10402*,10408*,11013*,11514*,11535
  - secondary: 403*,575*,1479*,2443*,2784*,3234*,3312*,5208*,5215*,5222,10424,10425,10978*

- MALABSORPTION (Contd.)
  - secondary (Contd.)
    - blind loops: 586,1483*,10405*,11389
    - diverticulitis: 4238,6264,11065*
    - drug-induced: 4120*,7211*,7227,8329*,8340,10404*,10413*,11523*
    - gastric surgery: 543,581*,585,1016*,1330*,1479*,2278*,2288*,3321*,3332,4118*,4235*,4241*,5027*,5209*,5217*,5228,5230,6044*,6848*,7205*,7219*,9278,9285,9286,10398*,10401*,10405*,10429,11515*,11531
    - intestinal resection: 45*,46*,48*,3313*,3701*,5209*,5231,5661*,5662*,6212*,7124*,7215*,9278,10400*,10405*,11065,11405*
    - irradiation: 54*,1475*,2451,3325,3326,3327,10426
    - parasitic infestations: 1489,2467,5223,5226,5227,6205*,7208*,7214*,10411*,10412*,11522*
  - treatment: 3701*,4232,4234
    - antibiotic: 3322,5202*,5214*,9262*,9270*,11514*
    - dietary: 5207*,6201*,6210*,6211*,6846*,7223,8329*,8334*,8335*,8337*,9257*,9262*,10420,11517*,11518*
    - folic acid: 578*,9262*
    - pancreatic supplements: 5230
    - vitamin B_{12}: 6210*,6211*,9262*
- MECKEL'S DIVERTICULUM: 485*,486*,510,511,1455,2394,3269,4151,4152,4153,5115,5116,6142,9161,9162,10300,10301,11247,11427,11428
- MEGACOLON: 594*,2496,2509,3366,4266,6223*,6250,6913*,7229*,8401,9339,9344,9365*,10477,11162,11547*
  - congenital: 598*,599,601,605,1502*,1534,2469*,2496,2497,2517,3358,3359,4260,4261,4262,4263,4264,4265,5243*,5246*,5281,6123,6220*,6226*,6230*,6252,6253,7007,7256,7271,8372,8373,8374,9295*,9340,9341,9342,9343,9345,10439*,10440*,10478,10479,10480,10481,10488,10489,10490
- MESENTERY: 2144*,2367*,2369*,3028*,4666,6907*,6981,10302
  - circulation: 3782*,4635*,6637,6640,7738,10951
  - cyst: 2218,2226,8022,8049,10043
  - diagnosis: 8022
    - radiology
      - angiography: 5870
  - lymphadenitis: 2226,3119,8244*,10000*
  - lymph nodes: 5955,9155
  - neoplasms: 8022,10325
    - benign: 3980,4941
    - malignant: 5955
  - nervous control: 9725*
  - surgery: 10282
  - vascular diseases: 1256,1383,1388*,2615*,3084*,3118,4881*,4940,5870,5920,6905*,8929,8966,8979,9173,10001*,10004*,10175,10303,11253
- MICROORGANISMS (see also Amebiasis; Cholera; Leptospirosis: Salmonellosis; Shigellosis and specific organs): 21,3069,3654,5632*,5902,7880,7980,11174

ICROORGANISMS (Contd.)
  in disease: 260*,272*,578*,863*,1483*,1504*,1655,1786,1818*,1825*,1832*,1905*,2134,2151*,2417*,2436,3072,3074*,3075*,3080*,3083*,3105,3106,3107,3229*,3234*,3242,3442*,3909*,3923,3941,4389*,4853,4854,4869,4882*,4894,4895,4898,4904,5355*,5841*,5842*,5864,5882*,5884*,5885*,5889*,5890*,5893,5896,5897,5901,5903,5907,5908,5911,5915,5918,5945,6116*,6117*,6119*,6163*,6169*,6334*,6399,6400,6401,6403,6404,6415,6532,6535,6874,6877,6878,6879,6882,6884,6885,6886,6890,6892,6895,6946,6950,6951,6953,6954,6955,6956,6957,6958,6959,6960,6963,6985,6990,7293*,7304,7404,7409,7585*,7624,7678,7698,7701,7702,7703,7998,8004,8005,8006,8007,8021,8030*,8032*,8059,8088,8089,8090,8091,8094,8096,8097,8098,8100,8101,8102,8103,8105,8106,8107,8108,8109,8112,8246*,8302*,8303*,8399*,8461*,8485,8741,8903*,8907,8908,8917,8918,8920,8941,8950*,8953*,8954*,8999,9000,9001,9002,9003,9004,9006,9007,9008,9011,9012,9065,9097,9116,9117,9143*,9154,9244,9270*,9292*,9365*,9542,9562,9621,9658,9711,9904,9955,9956,9959,9961,9962,9963,9964,9965,9966,10007*,10009*,10010*,10047,10048,10050,10051,10052,10053,10054,10055,10058,10059,10065,10066,10067,10068,10107,10111,10163*,10183,10262*,10264*,10297,10298,10410*,10411*,10425,10459,10521*,10568*,10615*,10660,10661,11164*,11181,11182,11183,11184,11185,11186,11187,11188,11189,11190,11191,11218*,11219*,11221*,11225*,11226*,11254,11258,11259,11261,11262,11263,11425,11426,11437,11438,11540*,11542*,11574,11637,11658,11666,11667,11820,11836,11838,11970
  gnotobiosis: 1483*,1786,1905*,2068,3229*,3659,5646,7712*,8303*,10739*,11005
  immune reactions: 3072,3074*,4883*,4904,5854,5860,5864,5901,5904,5911,5913,5915,5918,5919,6535,6893,6958,6959,6960,8099,8102,8104,8920,9005,9008,9870*,9960,9965,9966,9967,9970,10009*,10058,10060,10521*,10803*,11181,11189,11222*,11223*,11260,11261
  metabolic effects: 2068,4630*,5678,6471*,8491,8707,8843,9965
  normal: 1*,8*,998,999,1178,1907*,1912*,1918,2838*,2846,3658,3763*,3766,5633*,5663*,5678,6471*,6632*,6740,6883,7707*,8904*,9964,11425,11426
  nutritional changes: 1907*,1912*,3763*,3766,8815
TILITY (see also under Smooth Muscle; specific organs)
  pharmacolcgy: 10,57*,94*,102*,122*,126*,128*,129*,131*,132*,135*,137,1068*,1072*,1073*,1075*,1077*,1078*,1079*,1081*,1082*,1083*,1084*,1090,1394,1819*,2016*,2017*,2021*,2023*,2025*,2026*,2032,2379*,2957*,2959*,2961*,2962,2964,3391*,3685*,3768*,3769*,3774*,3775*,3776*,3781*,3786,3789,3790,4752*,4753*,4757*,4758*,4759*,4762*,4763*,4764*,4765*,4766*,5576*,5767*,5773*,5779*,5781,5879,6099,6684*,6713*,6742*,6743*,
MOTILITY, pharmacology (Contd.): 6748*,6749*,6751*,6753,6754,6758,6764,6778*,7040*,7052*,7116*,7228*,7701,7705*,7881*,7882*,7883*,7884*,7886*,7887*,7888*,7890*,7891*,7893*,7894*,7895*,7896*,7897*,7902*,7906*,7910*,7921,8202,8397*,8693,8762*,8804*,8805*,8806*,8808*,8810*,8820,9022*,9023*,9052*,9673*,9720*,9798*,9818,9838*,9840*,9845*,9846*,9847*,9848*,9849*,9850*,9852,11068*,11069*,11070*,11074*,11080,11171,11961,11966
  physiology: 120*,126*,1070*,1087*,1093,2955*,3779*,3782*,4759*,4760*,4766*,5768*,5769*,6745*,6746*,6749*,6755,6756,6759,6760,6761,6763,6765,7135,7701,7710*,7715,7721,7859,7881*,7885*,7888*,7889*,7904*,7911*,7915,7922,7924,8165*,8167*,8184*,8242*,8277*,8674,8762*,8803*,8806*,8807*,8809*,8810*,8811*,8812*,8814,8815,8816,8818,8822,8823,8898,9021*,9023*,9052*,9070*,9095,9138*,9344,9725*,9786*,9798*,9838*,9839*,9840*,9842*,9843*,9844*,9845*,9847*,9849*,9852,10076,10090*,10098*,10120,10121,10148*,10179,10216,10268*,10283,10288,10366,10923,11012*,11068*,11070*,11071*,11072*,11073*,11075*,11076*,11079,11080,11081,11082,11285*,11288,11442*,11674*
  technics of measurement: 1086*,3140*,3780*,3783*,4751*,4754*,4762*,4763*,7710*,7890*,7898*,7900*,7901*,7904*,7909*,9021*,9070*,9211*,9798*,9818,9843*,9850*,10366,11075,11076*,11082,11674*
MUCOVISCIDOSIS: 681,685,1566,1571,2573,2574,3393*,3395,3396,4334,4335,4336,5314*,5317,5320,6174,7306*,7307*,7308*,7309*,7310*,7311*,7332,8413*,8431,8432,8433,9239,9378*,9381*,9397,9398,9399,9400,9401,9402,9403,9404,10561,11675,11676*,11689
MUCUS: 3740*,3756*,7833*,8390

NEUROENDOCRINE CONTROL (see also Stomach, nervous control): 89*,199,980*,1097*,1102*,1103*,1445,1680,1681,1725*,1836*,1963,1998*,2038*,2085,2093,2434,2634*,2841,2850*,2869,2870,2885*,2890*,2927*,2985*,2995,2996,2997,3025,3581*
NEUROHUMORAL AGENTS: 514*,3642*,3669*,8824
  acetylcholine: 10*,107*,116*,122*,128*,132*,133*,1068*,1069*,1073*,1082*,1381*,1941*,2001*,2016*,2026*,2951*,2954*,2957*,2959*,2961*,3768*,3772*,3774*,3782*,3804*,3805*,4637,4760*,4772,5700*,5706*,5770*,5771*,5772*,5773*,6742*,6758*,6912*,6916*,7710*,7804*,7840*,7842*,7881*,7886*,7887*,7897*,7919,7927*,8040*,8702,8769*,8804*,8806*,8808*,9210*,9776*,9840*,9841*,11018*,11050*,11052*,11069*,11074*,11141,11143
  epinephrine: 100*,142*,884*,1053,1744*,1900*,1906*,1941*,2001*,2016*,2050*,2362*,2474*,2885*,2955*,2969*,3640*,3768*,3771*,3772*,3774*,3785,4716*,4720*,4757*,4758*,4765*,4786*,5343*,5696*,5764*,6637,6774*,6843*,7616*,7807*,7840*,7842*,7881*,7902*,7906*,7910*,7934*,8039*,8040*,8471*,8806*,8807*,8808*,9469*,9472*,9718*,10627*,10917*,11021* 11039*,11053*,11069*,11141,11161*,11323*

NEUROHUMORAL AGENTS, epinephrine (Contd.): 11332*
  norepinephrine: 884*,994,1020*,1844,1900*,1906*,2001*,2047*,2050*,2053*,2362*,2879*,2955*,2962,2969*,3178*,3768*,3777*,3781*,4563,4628*,4757*,4758*,4767*,4769*,5343*,5629*,5772*,6370*,6371*,6637,7616*,7709*,7807*,7881*,7910*,7918,7919,8471*,8816,8852,9469*,9472*,9720*,9855,9871*,10603*,10627*,10917*,11069*,11070*,11141,11332*
NUCLEIC ACID METABOLISM (see also Liver, metabolism, nucleic acid): 14*,989,1563*,1917,1921,3457,3501*,3527,3555,3646*,3656,3673*,4051*,4461*,4462*,5145*,5488,5638*,7327,7714*,7932*,8378,8706,9215*,9728,11062
NUTRITION (see also Absorption; Anorexia Nervosa; Kwashiorkor; Malabsorption; Obesity; Vitamins): 11*,45*,114*,171,182,191,195,197,484*,672*,714*,806*,828,913*,916*,979*,991,1021*,1028*,1125,1130,1159*,1380*,1393,1482*,1568,1617*.1724*,1828*,1912*,1932,1944*,1947*,1949*,2034*,2099,2147*,2289*,2389,2445*,2910,3018,3019,3331,3508*,3594*,3595*,3647*,3657,3664*,3693*,3700*,3814*,3821,3824,4327*,4459*,4553*,4659,4740*,4787*,4788*,4807,5002,5084,5200*,5464*,5577*,5578*,5586,5639*,5657*,5658*,5667*,5732*.5794*,5840,5896,5927,6022,6033*,6148*,6149*,6150*,6208*,6342*,6348*,6350*,6352*,6378,6676*,6713*,6724,6740,6773*,6784,6785,6786,6789,6816,6835,6846,6864,6887,6979,7223,7278,7711*,7743*,7778*,7786*,7796,7844*,7849*,7860,7879,7931*,7947,7948,7953,7961,8057,8205,8331*,8701,8703,8713*,8781,8785,8801,8813*,8841,8842,8867,8889,8906*,9059*,9075*,9090*,9262*,9308*,9407*,9511,9659,9721*,9722*,9735,9753*,9781*,9844*,9859*,9888,9910,9915,10072,10218,10223,10420,10429,10614*,10757,10918*,10920*,10958*,10963*,10975*,10976*,10990*,11023*,11087*,11090*,11098*,11102*,11108*,11199,11314*,11325*,11409,11426,11452*,11520*,11822,11846*,11853*,11859*,11949*,11960
  dietotherapy: 445,525*,591,743,1352,1481*,1664,2533*,2534*,2784*,3922,4065*,4172*,4338,4875*,5853,6201*,6846*,7370*,8283*,8337*,8939,8949*,9230,9311,9537,9610*,9617*,9969,9977,10177,10267*,10405*,10540*,10564*,10582,10758,10957*,11326*,11398*,11518*,11641*,11715,11794,11935*

OBESITY: 4955,6855,6856,6894,7124*,7132,7370*,8023,8024,8510,8701,9195,9977,10399*,11216*,11407
OMENTUM: 5960,6982,10005*
OXYGEN: 75*,997,1201,1745*,2965,3493,3693*,3813*,3829,4541*,4542*,5480*,5705*,5725*,6336*,6386,6405,6476,6633*,7438,7452,7458,7607*,8573,8829*,9524,9655,9708,9924,10633*,10635*,10677,10690,10701,10988*,11075*,11120,11500,11789,11861

PANCREAS: 1570,1959,1960,2559,2571,2580,2581,3725*,4727*,7591,9760,11170,11680,11687

PANCREAS (Contd.)
  anomalies: 683,1573,5316,5324,6303,7103,8206,8429,8430,9394,9395,10293,10553,11696,12011
  associated diseases: 65,445,521*,674,1570,3274*,4200,4330,4331,4332,4333,6299,6566*,7311*,7579*,7655,10557,11679,11682,11685
  biochemistry: 1047*
    chemical composition: 18,984,3657*,4640,6736*,6797,7877
    enzymes: 6311*
    molecular structure: 6726,6727,7876,7880
  calculi: 2578,8669,10569*,10579,11669*
  children: 2558*,6295*,6298,6303,7309*,7311*,7333,7352,8413*,8415,8429,9397,9406,10540*,10550,10611*,11199
  circulation: 13*,1900*,2586*,3640*,4337,4674,5630*,6301,7732,7735,8411*,8421,8422,8428,9376*,9387,9718*,10537*
  clinical studies: 7325,7331
  cysts: 675,678,687,2555*,2558*,2561*,2562*,2569*,2572*,4346,4348,5312*,6295*,6300,6301,7326,7333,8055,8412*,8434,8444,8475* 10026,10539*,10550,10566*,11315*,11677*,11690,11701,11736
  development: 30,1012,1935,3679,7733,10935*
  diagnosis: 1883,3041,3592*,3593*,5315*,5322,5324,7649*,8411*,8457,9374*,9384,10552
    biochemical procedures: 2579,7309*,8475*,9385,9802*,10554,10555,10924,10925,10942,11025*,11030*,11673*,11675*
    biopsy: 1574,6647*,10568*,11974
    duodenal content: 677,5728*,6296*,7649*,7853*,9381*,9804*,9992*,10538*,10540* 11013*,11025*,11065*,11327*,11670*,11671*,11672*,11676*
    enzymes: 1188,2556*,5327*,5336,7305*,8412*,8783,8789,9381*,9415*,10538*,11052*,11199,11433,11670*,11671*,11672*
    radiology: 493,679,686,702,2565,2570,2574,2575,2577,3845*,4343*,4344*,4345*,5318,5321,5323,6297*,7330,8435,8436,8437,9388,9390,9391,9392,9394,9413*,10543,10551,11052*,11486,11669*,11692,11693,11694,11695,11696,11958*,11994*
      angiography: 1703,2576,4880*,9386,9387,9389,10537*,10544,11208,11686
  diseases: 682,684,688,713*,1564*,1567,1576,1930,2563,3592*,4347,4940,5189,5319,5957,6298,6299,7085,7208*,7311*,7316*,7334,8240*,8667,8668,8669,9375*,9376*,9386,9389,9391,9393,9397,9721*,10542,10543,10545,10549,10555,10556,10683,10983*,11683,11684,11958*,11994
  diverticulitis: 6136
  ducts: 23*,31,5313*,5332*,6297*,7340*,7775*,8420,8430,8439,9413*,9417*,9662*,9663*,9851*,10563*,10568*,10941,11686,11692,11958*
  fistula: 678,680,684,1259,7320,11677*
  hormonal control: 9401,10567*
  immunology: 1577,2566,2567,5957,6304,11689
  metabolism: 4829,5641,5642,6312*,8689*,

ANCREAS, metabolism (Contd.): 8706,9802*,10935*,11108*
  morphology: 23*,31,33*,83*,676,1577,1930,1935,2873,4674,5652,6304,6647*,7327,7732,7734,7735,7850,7860,10942,11010*,11015*
  motility: 7859
    pressure studies: 8420
  neoplasms: 1565*,3609,5955,7325,8247*,10547,10548,10560
    benign: 2561,7326,8055,11315*
    malignant: 225,673*,679,1578,2565,3081*,3394,3593*,4340,4341,4342,4880*,5021*,5312*,5315*,5318,5322,5722*,6201*,6292*,6293*,6294*,6602*,7315*,7321,7322,7323,7324,7853*,7989*,8027*,8029*,8034*,8414*,8435,8440,8441,8442,8443,8445,8475*,8678,9373*,9374*,9405,9406,9485*,10405*,10408*,10538*,10559,10566*,10607*,11025*,11220*,11315*,11670*,11671*,11678*,11681,11700*,11740*
  nervous control: 676,2001*,4353*,6705*,9805*,11062
  obstruction: 3392*,5313*,5332*
  pancreozymin: 83*,98*,670*,671*,698,1048*,1900*,2000*,2582*,3392*,3593*,3650,3736*,4753,4771,5327,5722*,5728*,5731*,5793*,6566*,6700*,6702*,6743*,7851*,7852*,9373*,9379*,9726,9745*,9802*,9803*,9805*,9808*,9851*,10406*,10538*,10555,10570*,10683
  pathology: 3397,10565*,11013*,11031*,11052*,11670*,11672*,11673*,11686,11691
  perfusion: 1900*,2002*,4702*
  secretin: 33,92*,98*,104*,670*,671*,677*,698,1048*,1398,1900*,1979*,2000*,2582*,2585*,2897*,2912*,2915*,2918*,2924*,3392*,3593*,3633,3719*,3733*,3743*,4663,4699*,4701*,4702*,4737*,4738*,4753*,5147*,5315*,5327*,5696*,5704*,5728*,5729*,5793,6296*,6566*,6700*,6702*,7827*,7831*,7851*,7852*,7853*,8441,8813*,9373*,9379*,9380*,9726,9745*,9802*,9803*,9805*,9807*,9808*,9851*,9864*,10406*,10538*,10555,10569*,10570*,10683,10983*,11013*,11014*,11021*,11025*,11032*,11085*,11670*,11672*,11673*,11676*,11702*
  secretion: 19,23*,92*,109,671*,672*,1047*,1048*,1052,1063,1398,1580*,1590,1969*,1999*,2001*,2556*,3058,3407,3593*,3640*,3719*,3723*,3727*,3731*,3743*,3762,3789,3922,4227,4327*,4338,4423*,4560*,4675*,4746,4747,5091,5325,5636*,5726*,5728*,5729*,5732,5734*,5735,5736,5750,5856,6641,6659*,6686,6687,6715*,6716*,6724,6848*,7077,7078,7311*,7314*,7315*,7328,7329,7825*,7850*,7851*,7859,7877,7879,7880,7964,8228,8418,8424,8689*,8718*,8734,8772*,8781,8782,8783,8798,9083*,9379*,9802*,9803*,9804*,10650,10683,10918*,10924,10984*,11009*,11010*,11014*,11015*,11030*,11034*,11062,11681,11683,11685
    acid phosphatase: 1563*
    alkaline phosphatase: 1563*
    amylase: 3*,98*,475,670*,674,691*,705,1048*,1049*,1155*,1576,1911*,2000*,2557*,2564,3767,4354*,4699*,5315*,

PANCREAS, secretion, amylase (Contd.): 5328*,5727*,5731*,5733,5849*,6296*,6702*,6705*,6715*,6716*,6717*,6718*,6725,7305*,7849*,7852*,7875*,8412*,8419,8423,8773*,9081*,9147*,9373*,9379*,9381*,9416*,9664*,9805*,9806*,9851*,9992*,10536*,10554,10563*,10565*,10569*,10570*,10571*,10982*,11013*,11025*,11031*,11065*,11327*,11670*,11688,11700*,11701*,11703*,11704*,11716,11720*
    bicarbonate: 2002*,2915*,4699*,4702*,4738*,7832*
    calcium: 9833
    carboxypeptidase: 670*,5761*,6566*,8423
    chloride: 4702*
    cholesterol ester hydrolase: 8794
    chymotrypsin: 98*,105*,575*,670*,2000*,2008*,2557*,5314*,5730*,5761*,6566*,6736*,7318*,7852*,7871*,7876,8423,8795,8797,9393*,9379*,10982*,11065*,11327*,11672*,11676*,11720*
    elastase: 694*,1575,5637*,6296*,6727 6727
    leucine aminopeptidase: 10536*
    lipase: 475,670*,691*,705,1048*,1062,1988*,2000*,2008*,2011,2563,2564,2579,2946*,3767,4350*,5849*,6434,6566*,6702*,7312*,7313*,7849*,7874*,7878,8419,8423,9081*,9379*,9381*,9411*,9412*,9418*,9571*,9645*,10536*,10553,10565*,10569*,10571*,11065*,11327*,11670*,11673*,11688,11703*,11720*,11927*
    phospholipase A: 670*,2012,4700*,5328*,6566*
    proelastase: 6296*
    proteases: 1065,6705*
    protein: 2915*
    ribonuclease: 1916,2008*,8799
    trypsin: 98*,105*,575*,670*,2000*,2557*,2824,2840,3765,3905,5314*,5730*,5761*,6296*,6566*,6726,6736*,7318*,7327,7852*,7871*,7872*,8419,8423,8797,9081*,9373*,9379*,9381*,9415*.9416*,9428,9806*,9992*,10537*,10540*,10552,10571*,10582,10982*,11031*,11065*,11327*,11433,11670*,11671*,11672*,11676*,11705*,11720*
    trypsin inhibitor: 4748*
  surgery: 629,676,680,689,1572,1573,1578,2555*,2558*,2560,2569,2590*,3398,3399*,5318,5341,6292*,6293*,6294*,6295*,6300,6302,7314*,7315*,7336*,8417,8434,8678,8766*,9396,9409*,9426,10408*,10536*,10546,10552,10558,11677*,11697,11698*
  toxic effects
    chemical: 672*,4675*,6305*,8416
    radiation: 10536*
  transplantation: 2410,2411,4325*,4326*,4328*,4346,7317*,8425,8426,8427,8428,9147*,9377*,10541,10563*
  trauma: 678,1625*,2558*,2568,3398,7319,8415,11677*,11697
PANCREATITIS: 1592,2588*,3404,4365,5337,5637*,7352,8185*,8446*,8456,8458,9382,10572
  acute: 695*,703,705,1155*,1583*,1588,1589,1590,1593,1595,1597,1802*,1888,2582*,

PANCREATITIS, acute (Contd.): 2586*,2587*,2589*,2593,2594,2595,2599,2600,2603,2604,3402,3405,3407,4349*,4352*,4354*,4358*,4359,4360,4366,5326*,5330*,5332*,5339,5340,5342,5956,6307*,6308*,6310*,6321,6322,7335*,7337*,7343,7346,7349,7350,7351,7353,7354,7355,8412*,8421,8422,8447*,8451,8452,8453,8454,8455,8457,8475*,8952*,9069*,9147*,9384,9407*,9414*,9417*,9418*,9420,9421,9422,9423,9424,9425,9427,9428,9674*,10147*,10564*,10567*,10573,10576,10581,11013*,11671*,11701*,11705*,11708,11710,11712,11718
    pathophysiology: 691*,1581*,1582*,1586*,5331*,5333,5334,9411*,10571*,11702*,11706*,11711,11716
  associated diseases: 575*,704,1564*,1582*,1595,1596,1853,2591,2602,2608,3403,4354*,4359,5186,5326*,5329*,5339,7348,7353,8448*,8635*,9375*,9410*,9414*,9419,9668*,9670*,9678*,10566*,10567*,10573,10579,11701*,11705*
  children: 2592,4362,9429
  chronic: 692*,696*,697*,698,700,701,702,1584*,1587*,1591,1594,1596,1853,2583*,2585*,2590*,2596,2602,2605,2606,2607,3399*,3403,3407,3593*,4225*,4350*,4364,4367,4700*,5315*,5327*,5328*,5329*,5335,5336,5338,5341,6309*,6313,6315,6316,6318,7336*,7342,7345,7853*,8441,8448*,8449,8450,8451,8475*,8618*,9069*,9205*,9276,9383,9384,9408*,9409*,9410*,9418*,9426,9429,9469*,9981,10405*,10408*,10538*,10539*,10565*,10567*,10569*,10574,10575,10577,10582,10583,10584,10586,11013*,11025*,11669*,11670*,11671*,11673*,11677*,11698*,11699*,11700*,11709,11713,11715,11736*,11958*
    pathophysiology: 2597,4700*,11674*,11702*,11714,11716,11717
  clinical studies: 7344,7355
  circulation: 4355*
  diagnosis: 697*,1588,1593,1594,2606,3401*,3406,3407,3916*,4344,4349*,4351*,5336,5722*,6320,7335*,8441,8459,9411*,9427,9430,10001*,10564*,10575,10577,10580,10584,11699*,11713
    biochemical procedures: 11700*
    radiology
      angiography: 8449
  epidemiology: 1584*,2605
  etiology: 697*,1584*,1585*,1588,2598,4329*,4353*,4357*,4358*,4367,6306*,6310*,6319,6320,7341*,7347,7348,9419,10578,11699*,11703*
  experimental: 690*,691*,692*,693*,694*,696*,1582*,1583*,1586*,2557*,2582*,2584*,2586*,2603,3400*,4350*,4351*,4352*,4353*,4355*,4356*,4363,5330*,5331*,5334,5728*,6305*,6311*,6312*,6314,6322,7339*,7340*,7341*,8421,8422,8447*,8452,9411*,9415*,9416*,9417*,9418*,9851*,10563*,10565*,10567*,10568*,10570*,10571*,11702*,11703*,11704*,11705*,11706*,11718
  immunology: 10574
  metabolism: 4699*,4737*
  pathology: 2583*,9415*

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  toxic: 8451
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  associated diseases: 1489,10459,11518*
  clinical studies: 2208,4909,8998,11266
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  immunology: 239,3910*,8011,11196
  pathology: 264*,265*,285,290,480*,729,751,780,906,1238,1399,1706,2467,2709,3948,4281,4431,4432,5157*,5226,5227,5387,5390,5394,5568*,5622,5861,5867,6138,6205*,6400,6403,6912*,6913*,7117*,7118*,7208*,7214*,7275,7404,7405,7409,7751*,8113,8996,8998,9035,9156,9279,9344,9474*,10057,10296,10411*,10412*,10660,11286,11437,11522*,11558,11691,11726*,11839,11943
  prevention: 9937*,11264
  treatment: 238,242,243,245,253,254,285,1162,1169,1171,1498*,2125,2126,2708,3030*,3064,3070,3899,3900,3901,4842,4843,4845,4899,5861,5868,5924,6868,6869,6870,6871,6872,6873,6901,7406,8012,8014,8015,8016,8749,8907,8908,8909,8910,9154,9497*,9542,9937*,9955,9956,9957,9958.9961,10411*,10615*,10662,10770,11195,11214*,11224*,11264,11836,11837
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  diagnosis
    radiology: 8905*
RITONITIS: 269*;317,333,1070*,1215*,1274,1275,1276,1540,2148*,2165,2166,2167,2367*,3126,3905*,3975,3977,4416,4905,4915,5873,5889*,5890*,5897,5898,6102,6905*,6916*,6970,6971,6972,7990*,8051,8052,8361*,8636*,8905*,8928,8950*,8994,9147*,9203*,9248*,9365*,9940*,10000*,10016,10017,10018,10019,10020,10342*,10435*,10441*,10442*,10631*,11162*,11225*,11247,11326*,11402*,11403*.11736*
  children: 3976
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  acid: 163*,488*,580*,850,1013*,1243,1332*,1745*,1975*,2064,3668*,3711,4504*,4545*,4546*,4811,5201*,5478*,5550*,5672*,5805*,7589*,7704*,7723*,7764*,8238*,8729,9432*,9588,9616*,9860*,10741*,11321*,11767
  alkaline: 2*,9*,27*,580*,867*,1013*,1060*,1243,1332*,1606*,1745*,1801*,1808*,1843,1908*,2054*,2751*,2908,3434*,3441*,3513*,3596*,3598*,3668*,3670*,3697*,3711,4128,4378*,4504*,4545*,4546*,4631*,4632*,4686*,5201*,5344*,5350*,5382*,5550*,5672*,5805*,5832,6118*,6204*,6345*,6439,6456*,6600,7359*,7385*,7509*,7571*,7704*,7723*,7753*,7871*,7874*,7987*,8031*,8238*,8354*,8466*,8521,8534,8633*,8636*,9208*,9217*,9371,9416*,9498*,9597*,9600*,9640*,9641*,9665*,9729,9859*,9860*,10259*,10260*,10593*,10605*,10607*,10618*,10685,10688,10727,10741*,10800*,10921*,10953*,10955*,11703*,11732*,11737*,11756*,11767,11854*,11880*
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RTAL HYPERTENSION: 146*,741,804,811*,1639*,2615*,2668,2676,2790,2792,4375*,4434,4571,4572,4573,4574,4575,5547*,5996*,6364*,6443,6444,7411,7413,7414,7640*,8215,8533,8630*,8899,9447*,9469*,9472*,9474*,9516,9518,9649*,10624*,10692,10697,10699,10830*,10833*,10840*,10841*,11159*,11744*,11813,11814,11815,11816,11946
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  associated diseases: 708*,797,802,1287*,1581*,1707
  diagnosis: 3431*,4373*,4404,5552*,6343*,6367*,6373*
    radiology: 750,1711,1714,3028*
  etiology: 3490,4500*,6370*
  pathology: 3929
  treatment: 1601*;1707,1714,2780*,3467,4975*,5545*,6368*,6373*,7384*,7416,7625,8500,10625*,10626*,10627*,11743*
    portacaval shunt: 713*,715*,718*,721*,747,797,881*,885*,898,907,1630*,1713,1795*,1798*,1805*,1946*,2044*,2616*,2619*,2793,2796,3413*,3414*,3431*,3448,3648*,3816,3850,4376*,4379*,4386*,4391*,4400,4402,4403,4543*,4551*,4554*,4561,5376*,5379*,5397,5398,5399,5400,5551*,5552*,5558,5802*,6106,6369*,6371*,6446,6571*,6572*,6576,6707*,7163*,7379*,7382*,7410,7415,7608*,7609*,7610*,7621*,7623*,7789*,7937*,8470*,8498,8620*,9443*,9473*,9480*,9483*,9498*,9517,9651*,9654,10002*,10621*,10622*,10623*,10628*,10629*,10630*,10691,10693,10694,10696,10828*,10829*,11741*,11742*,11812,11817,11818
PREGNANCY: 4*,145*,159*,512,671,805,963,969,1550*,1544,1650,2033*,2112,2152,2233*,2680,2712,2753*,2754*,3345,3378*,3470,3521,3917*,4299,4403*,4408*,5421,5572*,5714*,5968,5989*,6375,6635,6636,6993*,7268,7276,7343,7349,7385*,7418,7500*,7836*,8476*,8540*,8600,8868,9466*,9500,9564,9580,9581,10614*,10653,10737*,10742*,10820,10821,11130,11403*,11478,11531,11572,11732*,11738*,11750*,11776,11791,11856*,11881*,11882*,11883*
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  aging: 609,5842*
  anomalies: 612,656,4269,4271,5282,7258,

- RECTUM, anomalies (Contd.): 10477,10491,10492,11569
  - associated diseases: 5300*,11215*
  - biochemistry
    - enzymes: 7704*,7987*
  - children: 596*,4281,7228*,7279,8368,9338,10491,10492,11570,11607
  - circulation: 7238*,7268
  - diagnosis: 604,649,8996,9351,10485
    - biochemical procedures: 10443*
    - biopsy: 2471*,2479*,2520,2534*,5283,7284,8399*,8912,8946,9295*,9297*,9306*,9316,9321,9342,9364*,10519*,11548*,11584
    - endoscopy: 2479*,2520,5283,9306*
    - radiology: 612,2520,2532*,4269,4301,5273,10450*,11583,11635
      - angiography: 7233*
      - lymphography: 5255,6246
  - diseases: 645,1506,1507,1508,1552*,3304*,4204,4272,4281,4282,4290,5239*,5241*,5283,6266,6280,6283*,7286,7291*,8383,8394,9320,9325,9366*,9844*,10452,10454,10507,10526,10533,11554,11555,11567,11595
  - diverticula: 2507
  - epidemiology: 11555
  - fistula: 608,2521,7254,7255,8352*,10471,11585,11586,11587,11588,11589,11590,11592,11595
  - immunology: 11548*,11602
  - microorganisms: 2475*,5842*,9333,11637
  - morphology: 1007,2471*,4250*,11613
  - motility: 6748*,7228*,8803*,9344,9839*
  - mucosa: 1007,5292*,5300*,6231*,7284,7704*,7987*,8399*,9321,10456,11548*
  - neoplasms: 1518,7242,10510,11607,11635
    - benign: 602,611,624,636,3351,4301,9297*,11608
    - malignant: 597*,604,609,610,613,617,637,649,1519,1520,2147*,2302*,2470*,2473*,2476*,2478*,2493,2529,3340*,3368,3369,3371,3372,4303,4304,4307,5248*,5249*,5250*,5253,5255,5256,5257,6222*,6225*,6237,6241,6243,6244,6246,6247,7231*,7233*,7238*,7243,7247,7253,7891*,8033*,8034*,8355*,8358*,8359*,8370,8386,8388,9297*,9303*,9304*,9306*,9349,9350,9351,9353,9354,9355,9356,9357,9358,9359,9366*,9995*,10035,10442*,10443*,10444*,10447*,10450*,10466,10498,10502,11220*,11543*,11545*,11622,11623,11624,11625,11626,11627,11628,11629,11630,11631,11632,11633,11634,11636,11637
    - villous: 11609,11610,11612
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  - pathology: 11585
  - perforation: 10472
  - polyps: 596*,643,1493*,1512,1533,2302*,2501,3352,4244*,6259,6260,7241,8355*,8368,8370,8371,9338,9355,10435*,10466,10467,11215*,11602,11605,11607,11637
  - secretion: 2008*
  - surgery: 594*,596*,609,613,617,621,624,637,654,655,1506,1509,1510,1511,1513,1518,1520,2470*,2478*,2487,2492,2501,2529,3039*,3304*,3336*,3337*,3353,3370,3371,3982,4275,4277,4283,5248*,5249*,5257,6235,
- RECTUM, surgery (Contd.): 7236*,7238*,7269,7285,9316,9327,10442*,10475,10493,10498,10512,10514,10515,10516,11555,11567,11571,11585,11586,11587,11588,11589,11608,11612,11613,11615,11616,11617,11618,11630,11631
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    - chemical: 1500*
    - radiation: 4251*,6231*,10433,11590
  - transplantation: 10516
  - trauma: 3364,11570,11571
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- SALIVA: 5*,73*,987,1041*,1414*,1909*,1971*,1974*,2926*,2943,3652,3653,3655,3720*,3908*,4639,4640,4644,4645,5019*,5721*,5723*,6053*,6719*,7718,7838*,7841*,7867,8044,8045,8459,8691*,8695,8784,8785,8790,8812*,9060*,9378*,9600*,9810*,9811*,9820,9821,9828,10564*,10929,11018*,11019*,11023*,11024*,11053*,11054*,11227*
- SALIVARY GLANDS: 6752,7801*,7865,8789,9994*,10928
  - absorption: 7846
  - aging: 8696
  - anomalies: 6934
  - associated diseases: 3906*,5329*
  - biochemistry
    - chemical composition: 3662,4639,4640,5725*,7838*,8973
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    - molecular structure: 7718
  - carcinogenesis: 995,2178,2180
  - children: 1221,3906*,5983
  - circulation: 1975*,3734*,4638,4641
  - development: 10949,11020*
  - diagnosis: 299,1057
    - biochemical procedures: 8695,8696,8697,8791,11019*
    - biopsy: 3098,3099,5329*,9385
    - radiology: 3031*,5644,11201
    - sialography: 72*,3720*,3878,5329*,7866,8976,9827,11227*
  - diseases: 6936,7716,8975
  - hormonal control: 5643,7717,8691*,8694,8787,9809*
  - immunology: 5723*,10929,11244
  - metabolism: 2842,4646,4931,4932,5644,7719,7845*,8694,9728
  - morphology: 4*,37,990,1223,1924*,1925*,1936,2868,2869,2870,2871,2914*,2936,3647*,3660,3682,3683,5651*,5725*,6642,6720*,6932,7843*,9738,11242
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  - neoplasms: 299,1224,2185,2186,3101,3878,3963,4936,5981,5982,5984,6923,6928,6929,8065,8972,8973,10036,10037,11201,11241,11242,11243
    - benign: 298,301,302,1221,3073*,5983,5986,6925,6930,8064
    - malignant: 298,301,302,2182,2183,3073*,3079*,3086*,3099,3907*,3962,3964,4935,5980,6926,6927,6932,9993*
    - mixed: 297,298,300,301,302,1222,2164,3098,3100,6924,6931,6933
  - nervous control: 72*,88*,992,994,1924*,

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  psychologic factors: 4703*
perfusion: 7846*,11018*
secretion: 70*,72*,73*,83*,97*,100*,110,111, 1057,1974*,1975*,2914*,2923*,2926*,2931*, 2932*,2936,2943,2944,3716* 3720*,3730*, 3734*,3906*,4639,4645,4703*,4704*,5708*, 5709*,5724*,5725*,5733,5757,5758,6718*,6719*, 6720*,7718,7811*,7839*,7840*,7841*,7842*, 7843*,7844*,7845*,7846*,7861,7862,7863,7864, 8691*,8695,8784,8785,8786,8787,8788,8790, 8791,8792,8809*,9809*,9810*,9811*,9821, 9822,9823,9824,9825,9826,9829,9830,10919*, 10926,10927,11018*,11019*,11020*,11053*, 11054*,11676*,11700*
surgery: 298,303,1221,1223,2154,2184,3086*, 3862,4933,4934,5985,6925,8974,10011, 10036
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  chemical: 3660,6305*
  radiation: 3661
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  biochemical procedures: 11181
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experimental studies: 1243,3229*,3909*,4905, 6957,6960,10007*,11260
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pathology: 1244,11261
prevention: 3931
treatment: 222,231,273*,996,3893,4856, 6882,8021,11224*
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associated diseases: 11818
clinical studies: 1287*,3248,3578*,3928, 3929,4434,4910,5357*,5388,5389,5862, 8996,9958,11224*
diagnosis: 241,1163,1715,3847*,5356*,7373*, 8484
  biochemical procedures: 11194,11196
  biopsy: 8912
  endoscopy: 11842
epidemiology: 1233,4913,6961,9335,11264
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immunology: 268*,1234,3087*,3847*,3928, 3930,5923,8110,11196
pathology: 1232,1237,5283,5545*
prevention: 3087*,11264
treatment: 209*,240,1164,1165,1236,1707, 2105,2108,2127,3063,3065,3894,3895,3896,

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  diagnosis: 6838*
  epidemiology: 5908
SHOCK: 1420*,1579*,1581*,1745*,2369*,2637*, 2400,3029*,3454,4136*,4656,4657,4658,4875*, 5875,5917,6308*,6476,6772*,7128,7273,7380*, 7710*,7926*,8244*,8471*,8887,8952*,9475*, 9484*,9575*,10002*,10019,10020,10071,10147*, 10451,11398*
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  pharmacology: 116*,117*,123*,132*,133*,134*, 1069*,1076*,1079*,1084*,1091,1092,2017*, 2022*,2028,2954*,3771*,3784,3787,4756*, 4767*,4768*,4769*,5764*,5770*,5780*,5781, 6762,6764,7897*,7912*,7916,7918,7919,8819, 9841*,9842*,9853,9854,9855,9857,10956*, 11643*
  physiology: 118*,119*,136*,1070*,1080*, 1501*,2019*,2020*,2024*,3768*,3785,3791, 4756*,4772,5631*,5763*,5772*,5776*, 6742*,6763,7885*,7908*,7912*,7917,8817,8819, 10956*
SPRUE (see Malabsorption)
STEATORRHEA (see also Malabsorption): 589,591,

- STEATORRHEA (Contd.): 2380*,5105*,5223,5327*,6043*,6848*,7124*,7208*,7216*,8329*,8334*,8336*,8341,8348,8439,9262*,9270*,9271,9276,9752*,10267*,10400*,10412*,10569*,10958*,11527,11671*,11699*,11700*
- STEROIDS (see also Absorption; Corticosteroids; Liver, metabolism, cholesterol and steroid): 74*,174,203,730,920*,1103*,1150,1732*,1742*,1752,1760*,1806*,1927*,1975*,2034*,2093,2220,2639*,2657,2733,2845,2989*,2990*,2995,3125,3515*,3586,4182,4188,4411,4479,4492,4565,4793,4826,5153*,6056,6459*,6461*,6463*,6681*,6771*,7159*,7503*,7519*,7559*,7564*,7602,7617*,7896*,7929*,7955,8214,8547,8580,8581,8707,8853,8887,9224,9578*,9587,9644*,10264*,10519*,10707,10708,10795*,10796*,10837*,10964*,11056*,11451*,11640*
- STOMACH (see Bezoar; Gastritis; Pyloric Obstruction; Ulcer; Volvulus): 146*,407*,425,2273,2350,2351,2916*,7591,9309,10180,10182,11170,11598
  - absorption: 9792*,9796*
  - achlorhydria: 96*,1019*,1059,2279*,2280*,6097,7103,8277*,9050*,9054*,9205*,10142*,10152*,10196,11047*,11056*,11467
  - aging: 399*,1336*,2006,2281*,2321,2322,3206,6107,6160*,9057*,9073*,9074*,9989,10162*,11057,11348
  - anomalies: 3949,4092,8206,8216,8217,8380,8756*,9094,9099,9103,10197,10201,11387
  - antrum: 81*,86*,102*,104*,108,517*,1040*,1042*,1072*,1417*,1423*,1982*,2286*,2334,2413*,2916*,2927*,3175*,3204,3732*,3744*,3805*,4709*,4710*,4716*,4718*,4719*,4720*,5156*,5698*,5704*,5706*,5711*,5743,5746,5774*,6157*,6704*,6714*,6744*,7053*,7054*,7164*,7806*,7823*,7837*,8291*,8754*,8758*,9058*,9069*,9072*,9099,9100,9776*,9794*,9805*,9816,9847*,10164*,11012*,11030*
  - associated diseases: 320,444,1666,1762*,2287*,2343,2345,2602,2773,3187,3196,3201,3205,5046,5047,5048,5049,5050,5051,5052,5053,5054,5055,5056,5057,5085,5229,5926,6105,7182,8058,8059,8179*,8184*,9063*
  - biochemistry
    - chemical composition: 3646*,3735*,3752,4660,4661,5751,7724*,7812*,7868,9794*,9846*,10922*,11332*
    - enzymes: 1901*,1903*,1995*,4629*,4662,5751,6154*,7049*,7166*,7704*,7799*,7987*,8765*,9079*,9110,11022*,11063*,11064*
    - molecular structure: 6721,8793*,8796
  - carcinogenesis: 1333*,2177,3172*,3182*,3214,3276*,5024*,5084,8201,10257
  - children: 441,1039*,1357,1367,1368,2303*,3232*,3195,3213,3671*,4102,4106,5714*,6033*,6034*,6090,6103,6646*,7100,7107,8179*,8199,8211,8218,8219,8220,9063*,9106,9781*,10131,10158*,10186,11040*,11359,11360
  - circulation: 424,518*,981*,1053,1978*,1981*,2415*,2835*,2849*,4067*,4635*,4708*,

- STOMACH, circulation (Contd.): 4719*,5081,5696*,5699*,5765*,6646*,6998*,7028*,7039*,7805*,7822*,7823*,8712,8778,9723*,9792*,9793*,10939*,11323*,11330*
  - clinical studies: 10244,11485
  - development: 1904*,2860,3667*,3681,4667*,4671,7826*,9796*,10943,11040*
  - diagnosis: 540,1362,2328,2338,2353,3040,3221,3223,4055*,4057*,4064*,4078,4080,4085,5019*,5073,6100,7105,9020*,9115,9124,10213,11393
    - biochemical procedures: 7060,8223,8690*,9073*,9073*,9079*,9098,9119,10234,10944,11037*,11040*,11056*,11059,11213,11318*,11346,11348,11355,11361,11372,11384,11385,11394
    - biopsy: 432,549,1324*,1342,1347,2283*,2299*,2300*,2325,2358,3027*,3203,3206,3213,3215,4086,4114,4706*,5020*,5042,5083,5095,6064,7047*,7050*,7054*,7096,7101,7115*,8313,8760*,8765*,9054*,9056*,9057*,9058*,9059*,9069*,9087*,9112,9123,9748*,10146*,10160*,10205,10210,10211,10212,10234,10236,10237
    - endoscopy: 406*,423*,431,436,473,474,1328*,1349,2283*,3051,3151,3180*,3204,3210,3212,4053*,4107,4113,4114,5782,5874,6047*,6051*,6052*.6084,6085,6094,6095,6096,6099,6852,6891,7033*,7052*,7054*,7094,7095,7103,7104,8208,8209,8211,8229,8281*,9067*,9068*,9071*,9087*,9091*,9122,9125,9126,9128,10157*,10166*,10202,10204,10205,10206,10207,10208,10209,10210,10215,11213,11315*,11336,11339,11345,11346,11347,11375 11382,11499
    - gastric analysis: 409*,411*,433,1339,2279*,2285*,2293*,2296*,2297*,2311,2344,2358,3225,4093,5021*,5093,5095,6047*,6733,7027*,7031*,7037*,7038*,7051*,7052*,7059,8172*,8247*,9209*,9785*,9836,10167,10168,10170,10174,10211,10246,10247,11024*,11026*,11056*,11328*,11355
    - radiology: 220,442,449,467,468,470,471,1373,2234*,2274*,2346,2602,3141*,3191*,3202,3204,3210,3214*,3222*,3225*,3671*,3875,4062*,4076,4082*,4090*,4103*,5055,5062,5078,5090,5094,6045*,6047*,6050*,6079,6080,6098,6161*,6579,7048*,7055,7056,7058,7066,7076,7087,7097,7099,7103,7109,8220,8229,8937,9051*,9056*,9062*,9068*,9087*,9089*,9103,9120,9121,9127,9135,9220*,10152*,10156*,10214,10215,10232,10233,10244,11038*,11209,11210,11211,11334*,11335,11337,11338,11340,11346,11358,11375
      - angiography: 11208
  - diseases: 313,420*,427,475,476,477,521*,1368,1470,2334,2338,2347,2352,2355,2579,3090,3173*,3952,4055*,4097,4102,4110,4940,5092,5093,5097,5713*,5714*,5899,5927,6062,6078,6104,6864,6899,6904*,6992,7029*,7037*,7050*,7062,7098,8001,8205,8210,8299*,9035,9051*,9063*,9095,9118,9215*,9244,9977,10140,10175,10176,10178,10183,10191,10192,10198,10215,10236,10237,10247,10314,11286,11346,

- STOMACH, diseases (Contd.): 11351,11357,11358,11367,11460,11940
    - mucosal injury: 74*,412*,3190*,3200,3756,4099*,5024*,5031*,5034*,5087,6175,7044*,7049*,7111,7113,8204,8300*,11324*,11456*
    - varices: 8207,9067*,9115
  - diverticula: 429,5098,6050*,7108,7112,9100,10184,10185
  - epidemiology: 5713*,9063*,9101
  - fistula: 546,3192,3853*,5014,6058,8769*,9069*,9224,9773*,9785*,9814*,11035*,11036*,11594
  - gastrin: 85*,86*,87*,90*,103*,104*,1042*,1043*,1044*,1055,1417*,1970*,1977*,1979*,1980*,1981*,1982*,1986*,2286*,2919*,2937,2942,3717*,3731*,3736*,3739*,3747*,3748*,3749*,3759,3805*,4710*,4718*,4720*,4721*,4722*,4742,5132*,5699*,5702*,5703*,5704*,5706*,5711*,5719*,5737,5738,5739,5740,5741,5742,5743,5744,5745,5746,5747,5748,5749.5750,6151*,6700*,6703*,6704*,6706*,6707*,6711*,6712*,6748*,7053*,7800*,7809*,7810*,7814*,7820*,7825*,7830*,7836*,7894*,8027*,8029*,8291*,8299*,8754*,8758*,8762*,8763*,9726,9771*,9772*,9773*,9774*,9775*,9776*,9790*,9797*,9814*,9848*,9849*,10968*,11028*,11030*,11031*,11032*,11034*,11448*,11931*
  - hormonal control: 3643*,3644*,3645*,3646*,3728*,4087,7171*,7173*,7798*,7833*,7835*,7870,9779*,9845*,11017*,11042*,11342
  - immunology: 12*,413*,420*,422*,1337*,1993*,2280*,2281*,2286*,2335,3176*,3186*,3190*,4058*,5714*,5720*,6701*,7824*,8171*,8763*,8765*,9073*,9111,9119,10165*,10188,10249,10944,11056*,11319*,11320*,11321*
  - intrinsic factor: 101*,1039*,1337*,1993*,1996*,2280*,2281*,3185*,3186*,3718*,3721*,3728*,3746*,3758,4683*,4731*,4732*,4733*,5663*,5714*,5720*,5721*,6053*,6701*,7210*,7777*,7779*,7782*,7821*,8168*,8179*,8764*,8765*,8767*,8768*,9119,9747*,9800*,9801*,11011*,11024*,11056*,11319*
  - metabolism: 1053,7049*,7812*,11029*
  - microorganisms: 2838*,4052*,9116,10163*
  - morphology: 82*,84*,86*,87*,106*,111,430,495,1008,1009,1926*,1928*,1937,2849*,2860,2925*,3645*,3665*,3667*,3669*,3681,4667*,4670,4671,6063,6106,6577,6646*,6658,7053*,7067,7101,7115*,7737,7826*,7837*,8225,8568,8690*,9053*,9062*,9074*,10070,10145*,10161*,10939*,11044*,11320*,11329*,11453*
  - motility: 80*,102*,127*,128*,129*,131*,401*,402*,408*,518*,1056,1068*,1072*,1074*,1075*,1089*,1094,1325*,1423*,1989*,2026*,2027*,2101*,2295*,2346,2354,2952*,2956*,3173*,3175*,3643*,3644*,3665*,3685*,3776*,4073,4123*,4191,4688*,4752*,4753*,4754*,4755*,5023*,5037*,5701*,5713*,5755,5768*,5769*,5774*,5778*,5782,6042*,6051*,6099,6713*,6743*,6744*,6747*,6748*,6761,7000*,7040*,7042*,7050*,7052*,7116*,7859,7888*,7893*,7895*,7896*,7904*,7905*,7906*,7907*,8165*,8166*,8167*,8184*,8202,8242*,8277*,8762*,8808*,8810*,8812*,8815,9052*,9070*,
- STOMACH, motility (Contd.): 9095,9211*,9720*,9725*,9786*,9798*,9818,9845*,9846*,9847*,9848*,10120,10148*,10179,10216,10366,11012*,11070*,11073*,11081,11171,11285*,11349,11441*
    - pressure studies: 407*,3773*,4751*,5765*,5766*,9780*,9850*
  - mucosa: 11*,12*,77*,84*,87*,95*,375,411*,420*,421*,422*,432,548,549,1038*,1058,1368,1901*,1904*,1926*,1979*,1991*,1995*,2276*,2279*,2281*,2283*,2289*,2331,2334,2340,2414*,2917*,2925*,2934*,2935*,3172*,3176*,3179*,3182*,3213,3645*,3669*,3681,3873,4053*,4055*,4064*,4067*,4123*,4565,4629*,4660,4661,4716*,4723*,4734*,5025*,5059,5060,5096,5101,5145*,5200*,5655,5995*,6030*,6035*,6063,6703*,6907*,7000*,7035*,7045*,7063,7101,7160*,7704*,7724*,7798*,7812*,7823*,7828*,7834*,7836*,7837*,7987*,8120*,8171*,8198,8225,8237,8299*,8310,8313,8690*,8699,8756*,8760*,8761*,8764*,8765*,8811*,9051*,9053*,9054*,9055*,9056*,9057*,9058*,9059*,9063*,9065*,9068*,9069*,9072*,9074*,9088*,9094,9202*,9748*,9793*,9796*,9797*,10161*,10165*,10167,10188,10189,10918*,10922*,10944,11017*,11022*,11029*,11030*,11037*,11056*,11240,11318*,11320*,11321*,11323*,11324*,11334*,11342,11348,11358,11363,11372,11387,11394,11496
  - neoplasms: 2320,2328,3217,5075,5080,6084,6085,8199,9071*,10219,10229,10230
    - benign: 447,448,2317,2327,2329,3216,4079,4081,5020*,5021*,5071,5072,6088,7066,7067,7073,7984*,8130,8192,8197,8237,9078*,9085*,9113,10192,10244,11375
    - malignant: 379,383,388,400*,409*,449,450,451,454,455,456,459,540,1326*,1331*,1332*,1333*,1336*,1345,1354,1355,1363,1369,1370,1371,1412*,1926*,2102*,2147*,2260,2274*,2282*,2284*,2285*,2287*,2293*,2295*,2299*,2302*,2310,2318,2319,2321,2322,2323,2324,2325,2326,2330,2353,2356,2357,2358,2359,2929*,2930*,3027*,3040,3175*,3177*,3180*,3184*,3185*,3215,3218,3219,3220,3221,3222,3223,3225,3226,3227,3276*,3875,3908*,3911*,3994*,4053*,4057*,4058*,4059*,4076,4077,4078,4080,4082,4083,4084,4085,4086,4087,4088,4089,4090,4091,4105,4667*,4876*,5017*,5018*,5019*,5020*,5021*,5070,5073,5074,5076,5077,5078,5079.5081,5082,5083,5084,5085,5136*,5172,5188,6018,6020,6024,6026,6030*,6031*,6046*,6048*,6049*,6056,6067,6068,6069,6070,6071,6072,6073,6074,6075,6076,6080,6081,6082,6083,6086,6087,6088,6089,6191,6697*,6995*,7031*,7038*,7041*,7055,7056,7057,7058,7059,7060,7061,7063,7064,7065,7068,7070,7071,7072,7079,7984*,8033*,8034*,8035*,8041*,8042*,8125*,8130,8131,8168*,8171*,8172*,8178*,8180*,8182*,8183*,8185*,8186,8187,8188,8189,8190,8191,8192,8193,8194,8195,8196,8198,8200,8235,8237,8277*,8279*,8323,

STOMACH, neoplasms, malignant (Contd.): 8765*, 8971,9052*,9057*,9062*,9067*,9068*,9075*, 9076*,9077*,9078*,9079*,9081*,9085*, 9087*,9096,9107,9108,9109,9111,9112, 9114,9129,9209*,9469*,9936*,9995*,10035, 10141*,10143*,10146*,10147*,10148*, 10151*,10159*,10164*,10166*,10172,10177, 10193,10209,10212,10225,10226,10227, 10228,10231,10232,10233,10234,10235, 10236,10238,10239,10240,10241,10242, 10243,10245,10248,10249,10250,10251,10252, 10253,10255,10256,10257,10342*,10365, 10401*,11047*,11220*,11312*,11313*,11314*, 11316*,11317*,11326*,11333*,11367,11368, 11369,11370,11372,11373,11374,11376,11377, 11378,11379,11380,11381,11382,11383,11384, 11385,11386,11387,11452*,11490

- villous: 11371

- nervous control: 89*,120*,127*,128*, 129*,131*,479,518*,1074*,1089*,1987*, 1989*,1997*,2913*,2916*,2927*,2952*, 3665*,3906*,4670,5101,5103,5141*, 5158*,5742,5743,6730,6744*,6761,6992, 7053*,7166*,7797*,7803*,7809*,7834*, 7895*,7905*,7906*,8219,9786*,9787*, 9788*,9797*,9845*,10145*,10918*,10943, 11054*,11073*,11329*,11352
  - psychologic factors: 5023*,11454*
- obstruction: 439,472,3175*,4056*,7113, 8203,8204,8977,11300
- pathology: 10158*,10189,11058,11345, 11360,11369
- perforation: 220,419*,437,2323,2332,4110, 4111,6103,10084,10186,11380
- perfusion: 4068*,8758*,8759*,9790*, 9845*,9846*,11036*,11448*
- polyps: 414*,436,1345,1356,1358,2282*, 2283*,2284*,2295*,3191*,3224,4051*, 4059*,4100,4105,5022*,5044,7066,7074, 7187,8185*,8223,8224,9067*,9068*,9072*, 9081*,9101,10193,10194,10195,11317*, 11326*
- secretion: 79*,89*,106*,109,403*,1052, 1058,1059,1971*,1972*,1973*,1976*, 1978*,1989*,1992*,1993*,2139*,2295*, 2300*,2916*,3218,3667*,3717*,3718*, 3729*,3744*,3752,3758,4058,5035*,5721*, 5753,6100,6699*,6713*,6730,7038*,7779*, 7854,7855,7868,8775,8776,8779,9209*, 9816,10918*,11057
  - acid: 74*,75*,76*,77*,80*,85*,91*,94*, 96*,99*,104*,108,479,524,564,1035, 1037*,1038*,1042*,1044*,1045*,1046*, 1047*,1054,1074*,1333*,1334*,1564*, 1977*,1980*,1981*,1982*,1983*,1985*, 1986*,1988*,1990*,1994*,1997*,2005, 2006,2281*,2286*,2311,2337,2349,2423, 2917,2918*,2919*,2920*,2921*,2922*, 2927*,2928*,2930*,2933*,2935*,2938, 2939,2945,3185*,3206,3271*,3721*, 3725*,3726*,3732*,3737*,3738*,3739*, 3741*,3742*,3760,3906*,3995*,4104, 4160*,4551*,4705*,4708*,4709*,4710*, 4711*,4712*,4713*,4715*,4717*,4719*, 4721*,4722*,4727*,4734*,4735*,

STOMACH, secretion, acid (Contd.): 4738*,4740*, 4741,4744,5143*,5149*,5150*,5153*,5156*, 5696*,5697*,5700*,5703*,5705*,5706*,5707*, 5710*,5712*,5715*,5716*,5755,6060,6152*,6160*, 6169*,6178,6696*,6697*,6698*,6703*,6704*, 6706*,6707*,6708*,6709*,6711*,6712*,6729, 6731,6732,6734,7031*,7051*,7052*,7053*,7088, 7090,7091,7092,7175*,7177*,7777*,7797*, 7798*,7802*,7803*,7805*,7809*,7810*,7812*, 7813*,7814*,7815*,7816*,7817*,7818*,7819*, 7820*,7821*,7822*,7824*,7825*,7826*,7827*, 7828*,7829*,7830*,7832*,7835*,7836*,8057, 8166*,8168*,8172*,8179*,8181*,8184*,8278*, 8282*,8289*,8291*,8297*,8716*,8717*,8754*, 8755*,8756*,8757*,8758*,8759*,8760*,8761*, 8762*,8767*,8768*,8778,8951*,9050*,9052*, 9054*,9061*,9062*,9064*,9070*,9088*,9197*, 9201*,9204*,9205*,9206*,9238,9766*,9767, 9768*,9769*,9770*,9771*,9772*,9773*,9774*, 9775*,9776*,9777*,9778*,9779*,9780*,9781*, 9782*,9783*,9784*,9785*,9786*,8787*, 9788*,9789*,9790*,9791*,9798*,9799*,9801*,9815, 10142*,10146*,10152*,10171,10172,10173,10174, 10221,10234,10246,10280,10335*,10337*,10343*, 10361,11011*,11012*,11014*,11016*,11023*, 11028*,11031*,11032*,11033*,11034*,11035*, 11036*,11037*,11038*,11039*,11041*,11042*, 11043*,11044*,11045*,11047*,11048*,11049*, 11050*,11051*,11054*,11055*,11056*,11060, 11061,11327,11343,11344,11347,11352,11364, 11443*,11448*,11467,11931*

- in disease: 68*,444,478,479,524,564, 1035,1324*,1329*,1333*,1367,1472*, 1564*,1762*,1998*,2276*,2293*,2298*, 2303*,2319,2337,2343,2423,2929*,2930*, 2933*,3032*,3185*,3271*,3729*,3755, 3857,3929,4095,4423,4551*,4706*, 4737*,4739*,4745,5023*,5036*,5099, 5100,5149*,5153*,5157*,5181,5582, 5698*,5713*,5992*,6033*,6060,6106, 6159*,6169*,6178,6696*,6697*,7031*, 7032*,7088,7093,7175*,7177*,7777*, 7818*,7822*,7829*,7835*,7869,8026*, 8027*,8028*,8029*,8040*,8057,8059, 8166*,8168*,8172*,8179*,8181*,8184*, 8186,8212,8278*,8282*,8289*,8291*, 8313,8568,8756*,8757*,8760*,8761*, 8767*,8774,8951*,9050*,9052*,9054*, 9061*,9064*,9097,9197*,9201*,9204*, 9205*,9206*,9238,9766*,9767*,9770*, 9771*,9774*,9775*,9799*,9801*,10142*, 10146*,10152*,10167,10169,10171,10172, 10173,10211,10221,10234,10245,10246, 10280,10335*,10337*,10343*,10361, 11011*,11012*,11037*,11047*,11055*, 11056*,11058,11061,11327*,11342, 11364,11443*,11467,11487,11931*
- drug effects: 66,67*,69*,70*,76*,77*, 81*,85*,86*,87*,90*,93*,94*,97*,102*, 107*,417*,524*,1041,1043*,1044*, 1045*,1047*,1052,1053,1056,1416*, 1970*,1983*,1984*,1985*,1987*,1990*, 2006,2337,2913*,2918*,2920*,2922*, 2929*,2933*,2935*,2939,2940,2945, 3644*,3685*,3716*,3717*,3722*,3724*,

TOMACH, secretion, drug effects (Contd.): 3736*,3737*,3741*,3745*,3747*,3760,4708*,4711*,4718*,4720*,4722*,4723*,4725*,4726*,4727*,4730*,4734*,4740*,5132*,5153*,5156*,5159*,5160*,5695*,5697*,5699*,5708*,5709*,5715*,5718*,6099,6152*,6703*,6707*,6708*,6712*,6731,7051*,7052*,7053*,7092,7115*,7171*,7797*,7804*,7805*,7806*,7807*,7808*,7811*,7815*,7818*,7819*,7820*,7870,7895*,8297*,8301*,8316,8758*,8760*,8761*,8767*,8768*,8769*,8778,8951*,9097,9206*,9766*,9767*,9768*,9769*,9770*,9771*,9772*,9774*,9777*,9778*,9782*,9785*,9787*,9789*,9791*,9798*,9801*,9815,9817,9820,10171,10172,10173,10335*,10343*,11011*,11027*,11031*,11032*,11033*,11034*,11035*,11036*,11037*,11039*,11041*,11043*,11044*,11045*,11047*,11048*,11049*,11050*,11051*,11054*,11055*,11056*,11341,11343,11344,11448*,11456*,11931*

  electrolytes: 95*,99*,1994*,2344,2917*,2919*,2929*,2935*,3032*,3722*,3732*,3761,4705*,4721*,5182,5707*,5717*,6710*,7815*,9780*,9781*,9783*,9789*,9791*,9799*,10246,11027*,11042*

  mucus: 1040*,1416*,3752,3756,3757,4169*,4707*,4709*,4716*,4724*,5156*,5710*,6035*,7033*,7724*,7803*,7826*,7833*,7837*,8756*,8769*,9783,9795,11023*,11054*,11456*

  neurohumoral control: 3724*,3725*,3731*,3732*,3736*,3739*,3748*,3749*,3753,4095,4705*,4709*,4712*,4730*,5702*,5711*,5716*,5719*,5752,5754,6706*,6709*,6714*,7053*,7804*,7809*,7813*,7814*,7815*,7816*,7823*,7827*,7832*,8314,11042*,11050*

  pepsin: 113*,217,465,1039*,1054,1066,1067,1355,1366,1994*,2015,2947*,2949,2950,3641*,3717*,3750,3752,3753,4160*,4709*,4714*,4718*,4722*,4725*,4726*,4728*,5100,5712*,5716*,6696*,6706*,6711*,6712*,6721,6722,6723,6737*,7088,7798*,7802*,7810*,7814*,7815*,7818*,7871*,8003,8179*,8758*,8769*,8770*,8793*,8796,8801,8802,9064*,9074*,9110,9197*,9767*,9768*,9772*,9773*,9776*,9778*,9780*,9782*,9783*,9784*,9788*,9834,9989,10169,10174,10362,10986*,11028*,11040*,11050*,11063*,11064*,11067,11455*

  technics of study: 78*,79*,80*,81*,99*,101*,103*,1037*,1046*,1157*,1346,1347,1443,1995*,2925*,2928*,2941,3738*,3742*,3751,3754,3995*,4053*,4104,4713*,4714*,4715*,4717*,4726*,4728*,4729*,4736*,4741,4743,4744,4745,4755*,5149*,5150*,5697*,5719*,5756,6097,6696*,6697*,6698*,6699*,6728,7087,7090,7091,7798*,7802*,7803*,7819*,7828*,7829*,7830*,7834*,7835*,7836*,7870,8057,8172*,8186,8282*,8754*,8755*,8756*,8757*,8758*,

STOMACH, secretion, technics of study (Contd.): 8759*,8760*,8761*,8762*,8767*,8768*,8769*,9052*,9205*,9768*,9770*,9771*,9772*,9775*,9776*,9777*,9778*,9779*,9780*,9782*,9783*,9784*,9786*,9787*,9788*,9789*,9790*,9791*,9795*,9798*,9801*,9815,10142*,10335*,10337*,11011*,11012*,11014*,11016*,11023*,11027*,11028*,11031*,11032*,11033*,11034*,11036*,11037*,11038*,11039*,11041*,11042*,11043*,11044*,11045*,11047*,11048*,11051*,11054*,11055*,11059,11060,11327*,11343,11344,11448*

  surgery (see also Gastrectomy): 421*,430,438,451,455,472,517*,1372,1373,2275*,2284*,2318,2321,2322,2348,2355,2357,2837*,3179*,3187*,3191*,3198,3202,3209,3853*,3859,3983,4052*,4059*,4062*,4063*,4082,4091,4103,4711*,4832*,5028*,5065,5074,5075,5077,6020,6024,6088,7074,7100,7106,8139,8170*,8200,8203,8204,8293*,9135,9986,10095*,10181,10216,11160*,11298,11388,11493,11679,11680

    antrectomy and vagotomy: 5069,5148*,6714*,7075,7186,7189,8176*,8222,8289*,8291,8292*,8321,8754*,10153*,10341*,10353,11440*,11442*,11484,11487,11519*

    gastroenterostomy: 3744*,4069,4070,4181,7193,8288*,8290*,9204*,10146*,10151*,10341*,10401*,10565*,11327*

    gastroenterostomy and vagotomy: 554,3277*,4061*,4166*,5147*,5152*,6163*,6164*,7042*,7075,7190,8176*,8290*,8292*,8335*,8933,9024,10142*,10336*,10341*,11441*,11442*

    gastrostomy: 383,520*,2339,3195,4065*,4106,4326*,6032*,6033*,6034*,6040*,6057,7102,8221,10154*,10155*,10267*,10565*,11562

    pyloroplasty and vagotomy: 404*,520*,552,566,1016*,1344,1450,2413*,2424,2426,2916*,3277*,4060*,4166*,4167*,4973*,5152*,5066,5067,5701*,5988*,6038*,6101*,6165*,6168*,6357*,7036*,7044*,7089,7165*,7168*,7809*,8127*,8176*,8285*,8289*,8290*,8291*,8292*,10142*,10267*,10336*,10340*,10341*,11354,11441*,11442*,11484,11519*

    vagotomy: 84*,90*,531,543,559,568,1452,1462,1982*,2301*,2336,2361*,2413*,2913*,2920*,3238*,3280*,3288,3869,4171*,4711*,4730*,4837*,5026*,5068.5134*,5152*,5165,5174,5698*,6054,6058,6059,6159*,6164*,6165*,6166*,6180,6906*,7042*,7053*,7105,7166*,7182,7183,7215*,7641*,7906*,8165*,8167*,8173*,8177*,8241*,8324,8327,8758*,8807*,9037,9092,9204*,9205*,9208*,9685*,9686*,9770*,9771*,9772*,9773*,9774*,9783*,9784*,9790*,10153*,10173,10200,10279,10336*,10354,10355,10356,10357,11016*,11034*,11035*,11039*,11061,11070*,11134,11349,11352,11440*,11483,11485,11486,11489

STOMACH (Contd.)
surgical technics: 4167*,7074,8777,9120,9130,10095*,10145*,10152*,10154*,10155*,10273*,11330*,11353,11354,11377,11392,11439*,11485,12010
toxic effects
chemical: 472,2344,4094,4099,5031*,5099,5145*,7160*,8174*,8181*,8202,8203,8297*,9032,9246,10161*,11324*
physical: 5034*,5102
radiation: 3200,4739*,5103,8699,9088*
transplantation: 2286*,6035*
trauma: 439,1349,2342,2416*,7114
volvulus: 467,468,2341,2342,4101,9048,11359
SULFOBROMOPHTHALEIN: 158*,223,788,821*,825,1051*,1106*,1113*,1609*,1670,1696,1715,1742*,1822*,2583*,2622*,2924*,2999,3451,3512*,3515*,3795*,3808*,4383*,4392*,4404,4460*,4468,4787*,4799,5358*,5382*,5432,5522,5795*,6323*,6327*,6329*,6341*,6354*,6361*,6409,6427,6465*,7393*,7395*,7448,7449,7503*,7560*,7568*,7571*,7605,7757*,7940*,8305,8469*,8472*,8528,8529,8530,8531,8536*,8543*,8825*,9455*,9458*,9459*,9460*,9461*,9468*,9556,9557,9641*,9644*,9646*,9861*,9916,9917,10839*,10842*,11091*,11097*,11734*,11748*,11749*,11757*,11758*,11772,11773,11774,11849*,11850*,11855*
SURGICAL APPARATUS: 407*,800,936,968,1213,2102*,2107,2124,2130,3039*,3046,3179*,3494,3846*,3853*,3868,4066*,4620,4832*,4836*,4840*,5844*,5845*,5876,5877,6040*,6109*,6226*,6302,6600*,6842*,6858,6859,6860,6861,7027*,7494,7986*,8352*,8355*,8356*,8464*,8649,9148*,9151,9321,9332,9667*,10116,10117,10202,10204,10310,10322,10515,10827*,11322*,11331*,11397*,11399*

TRANSPLANTATION (see also Immunology: Liver, transplantation)
TRYPSIN (see Pancreas, secretion)
TYPHOID FEVER (see also Salmonellosis): 1241*,4927,8246*,9711
carriers: 1658,3037*,4929,4930
children: 6990
clinical studies: 1242,3973
complications: 1385
diagnosis: 287,1179,1181,6990
epidemiology: 271*
immunology: 4928
pathology: 278
prevention: 1001
treatment: 2106,3037*,5881,5919,8000,8021

ULCER (see also Antacids; Anticholinergics; Duodenum; Gastrectomy; Intestine, Small, ulcer, nonspecific, Ulcerative Colitis): 517*,4056*,4204
aging: 4164*
children: 7185,8248
clinical studies: 5151*

ULCER (Contd.)
Curling: 2416*,6109*,7162*,8302*,8303*,8304*,9064*
drug-induced: 74*,412*,514*,545,561,1453,1500*,2934*,3239,4133,4159*,4163*,4180,4183,4205,5031*,5104*,5160*,5161*,5183,5185,6151*,6154*,7051*,7170*,7174*,7179,8214,8248,8297*,8299*,8301*,9144*,9157,9200*,9246,9769*,9795*,10373,10374,11450*,11451*,11456*,11457*,11643*
epidemiology: 9219*
etiology: 3273*,3274*,11458*
experimental: 74*,412*,514*,516*,1409,1410*,1411*,1416*,1417*,1420*,1421*,1425*,2934*,3188*,3272*,3273*,3274*,3275*,3276*,3281*,4162*,4163*,4164*,4165*,4728*,4740*,5158*,5159*,5161*,5712*,6145*,6146*,6147*,6148*,6149*,6150*,6151*,6153*,6154*,6155*,6194*,6357*,7159*,7173*,7174*,7179,8025*,8297*,8298*,8299*,8300*,8301*,8754*,9088*,9144*,9197*,9198*,9199*,9200*,9201*,9202*,9210*,9213*,9245,9769*,9795*,10374,11049*,11333,11449*,11450*,11451*,11452*,11453*,11455*,11456*,11457*,11458*,11643*
nonspecific (simple): 6128,8249,8335,9220*,9336,10289,10290,10438*,10457,11556
pathology: 10455
peptic: 1350,5066,8215,8306,9052*,9061*,9228,9752*,10557,11025*,11322*,11372,11677*
aging: 2433,3298,3299,4186,5032*,5135*,5143*,10387,11462,11463
anastomotic: 458,4170*,4197,6164*,7195,8288*,8293*,8294*
associated diseases: 539,542,546,569,889,1418*,1458,1463,1472*,1824*,3166,3297,3300,4175,4198,4203,4551*,5076,5147*,5186,5188,5568*,5988*,5989*,5992*,6050*,6081,6161,6176,6182,6183,6188,6357*,6570*,6977,7070,7158*,7163*,7169*,7187,7641*,8040*,8041*,8278*,8323,8328,8948*,9018*,9069*,9072*,9193,9207*,9224,9235,9239,9244,9709,10040,10246,10278,10338*,10343*,10352,10360,10363,10364,10367,10371,10392*,10566*,11367,11443*,11466,11469,11938,12010
children: 3278*,3286,3289,3290,3295,4182*,4195*,4199*,5164,5190,5568*,6192,7185,7196,8312,10368,10369,10370,11465,11475,11477
circulation: 3914*,7169*
clinical studies: 203*,553,563,1447,1455,1456,2431,2433,3271*,3289,3290,3294,3295,3296,3297,3298,3302,3303,4178,4179,5141*,5151*,6156*,6192,7181,8296*,9211*,9229,10358,11443*,11444*
complications (see also Pyloric Obstruction): 523*,1431,3287,4188,7301,8176*,11396,11492

CER, peptic, complications (Contd.)
    bleeding: 532,534,1422*,1429,1440,1451,2143*,2376*,2419,3278*,3279*,3299,5032*,5134*,5141*,5170,5178,5180,6168*,6171,6172,7163*,8170*,8176*,8214,8286*,8294*,8296*,8302*,8933,9067*,9078*,9203*,9206*,9216*,9223,9242,10151*,10336*,10342*,10343*,11159*,11443*,11474,11475,11488
    perforation: 528,530,554,566,928,1422*,1453,2436,3278*,3286,3916*,4162*,4171*,4173,4175,4183,4185,4205,5135*,5144*,5146*,5179,5180,5955,6151*,6163*,6171,6173,6185,7172*,7176*,7195,8294*,8296*,8302*,8952*,9078*,9203*,9206*,9216*,9240,10000*,10001*,10151*,10339*,10342*,10357,10358,10381,10382,10457,11439*;11440*,11476,11477,11478,11479,11480
  diagnosis: 521*,536,538,540,541,558,562,563,565,1348,1350,1443,2279*,2285*,2331,3180*,3293,3916*,4053*,5190,6177,6183,6192,6193,7044*,8305,8328,9062*,9079*,9145*,9222,9243,10172,10379,10386,11445*,11459,11476,11500
    biochemical procedures: 9060*,9205*,9945,10362,11317*,11471
    biopsy: 9212*
    endoscopy: 9068*,9071*,9204*,10209,10366,10378,10380
    radiology: 3220,4177,6162*,6191,7097,9068*,9204*,9936*,10566*,11443*,11472,11473
  epidemiology: 515*,544,1412*,1414*,1422*,1424*,2421,3078*,3294,3303,4201,4735*,5032*,5135*,5138*,5139*,5144*,6170,7161*,7176*,7196,8296*,8307,8308,8309,8947*,9235,9242,10227,10338*,10339*,10371,11446*,11462,11464,11476,11502,11647*
  etiology: 518*,522*,526*,550,1040*,1409*,1417*,1429,1432,1433,1445,1449,1460,2412*,2417*,2435,3275*,3284,3296,3301,3908*,3914*,4159*,4174,4192,4201,4203,4205,4728*,5076,5137*,5138*,5139*,5157*,5158*,5160*,6145*,6357*,7046*,7051*,7164*,7169*,7173*,7194,7301,7833*,8027*,8278*,8293*,8294*,8295*,8300*,8398,9203*,9221,9225,10177,10364,10372,10373,10375,10376,10828*,11012*,11443*,11446*,11454*,11461,11482
  hormonal control: 6158,8314
  immunology: 2150*,8279*,8293*
  metabolic changes: 548,1408*,1419*,1446,1461,2434,3381*,4161*,4169*,4182,4191,4200,5028*,5136*,5217*,6042*,6154*,6174,6189,6596*,7397*,8234,9217*,9232,9285,10349,10350,10359,10362,11444*,11514*
  microorganisms: 4052*
  motility: 11012*

ULCER, peptic (Contd.)
    pathology: 523*,1418*,1423*,1434,2414*,2415*,4667*,5151*,5189,6157*,7164*,8297*,8300*,8311,8318,8325,10344,10363,10365,10377,11362,11445*,11470,11471
    psychologic studies: 519*,522*,550,5137*,5138*,5140*,6147*,7037*,7178*,7194,8280*,9996*,11447*,11481
    secretion: 2423,2929*,2930*,2933*,3185*,3271*,3291,3721*,3729*,4052*,4160*,4168*,4711*,4713*,4735*,5132*,5140*,5143*,5147*,5149*,5150*,5153*,5159*,5160*,5181,5182,5098*,5992*,6152*,6159*,6160*,6165*,6179,6696*,6697*,6710*,7177*,7809*,7835*,7869,8172*,8278*,8282*,8313,8757*,8951*,9205*,9206*,9209*,9238,9767*,9771*,10152*,10172,10246,10335*,10337*,10361,10362,11011*,11012*,11023*,11033*,11047*,11048*,11055*,11327*,11341,11443*,11467,11482,11487
    treatment: 565,566,1448,2417*,4185,4206,5162,5163,6148*,6173,6184,7173*,7197,7301,8318,9214*,9230,9243,10177,10386,10387,11443*,11476,11494,11500,11501,11502,11503,11504,11505,11506,11656,11666
      freezing: 68*,91,403*,405*,1459,1460,1465,2418*,2422,2428,2430,3188*,3194,3207,3292,4066*,5034*,5090,5702,5710*,7184,7198,9216*,10344,10348
      medical: 76*,428,525*,535,536,547,555,560,658*,665,666,1329*,1413*,1426,1435,1436.1438,1439,1440,1441,1462,2150*,2331,2425,2427,2429,3272*,3273*,3281*,3283,3776*,4165*,4168*,4172*,4187,4188,4189,4190,4193,4201,4202,4728*,5154*,5161*,5175,5176,5177,5184,6155*,6162*,6179,6190,6194,7159*,7171*,7180,8002,8169*,8281*,8283*,8284*,8288*,8315,8316,8317,9197*,9210*,9213*,9227,9236,9237,10343*,10344,10348,10383,10384,10385,10388,10389,10390,11051*,11168,11170,11341,11445*,11495,11496,11497,11498,11507,11508
      surgical: 90*,397*,404*,520*,523*,527*,528,530,531,532,533,534,537,543,549,551,552,554,559,566,567,667,1341,1353,1359,1370,1427,1428,1430,1431,1433,1442,1450,1452,1454,1456,1457,1464,2295*,2298*,2305,2310,2314,2413*,2420,2424,2426,2432,3277,3279*,3280*,3282,3284,3285,3288,3291,3292,4059*,4061*,4166*,4167*,4168*,4170*,4171*,4173,4176,4181,4184,4196,4197,4837*,5026*,5028*,5032*,5040,5044,5064,5066,5134*,5137*,5142*,5147*,5148*,5151*,5152*,5164,5165,5166,5167,5168,5169,5170,5171,5172,5173,5174,5289*,6042*,6043*,6044*,6081

- ULCER, peptic, treatment, surgical (Contd.): 6156*,6157*,6164*,6166*,6167*,6168*,6169*,6180,6181,6182,6185,6187,6189,7042*,7068*,7167*,7168*,7172*,7175*,7178*,7183,7186,7188,7189,7190,7191,7296,7298,7641*,8176*,8185*,8222,8230,8236,8247*,8277*,8280*,8285*,8288*,8289*,8290*,8291*,8292*,8296*,8319,8320,8321,8322,8324,8325,8326,8327,8951*,9037,9081*,9085*,9086*,9087*,9109,9204*,9208*,9226,9231,9233,9234,9240,9241,9285,9286,9685*,10143*,10151*,10152*,10238,10337*,10340*,10341*,10342*,10344,10345,10346,10347,10348,10349,10350,10351,10353,10354,10355,10356,10357,10359,10403*,11326*,11394,11396,11439*,11440*,11441*,11442*,11484,11486,11487,11489,11490,11491,11492,11493,12010
  - stress: 1411*,1421*,1425*,1432,1437,1442,4159*,4164*,4186,4202,4740*,5133*,5158*,5191,6146*,6147*,6152*,6153*,6154*,6155*,6175,7159*,8298*,9198*,9199*,9201*,9202*.9213*,9219*,10375,10376,11449*,11453*,11455*,11457*
- ULCERATIVE COLITIS: 3074*,3982,7303,8039*,8401,9372,9752*,11651,11652,11654
  - associated diseases: 662,668,1550*,1552*,2536*,2545,2550,2552,3377*,3383*,4320,4420,5307,5326*,6285*,6289,6290,7289*,7292*,7294,7295,8240*,8398*,8400*,8410,10392*,10394*,10430*,10519*,10520*,11511*,11644*,11653,11659
  - children: 2546,2548,2549,2551,3385,5306,6286*,7228*,8403,8404,8405,10535
  - circulation: 4243*
  - clinical studies: 663,669,1552*,1555,1561,2538*,2547,2548,2549,3378*,3379*,3380*,5234*,5303*,5304,5310,7302,8397*,9370,10430*,10519*,10527
  - complications: 659,1552*,4324,7204,7300,8400*,10430*,10518*,10519*,11162*,11640*
  - diagnosis: 1388*,1467*,1554,2532*,2534*,2535*,2537*,2540*,2553,3335*,3384,4316,5240*,5308,7297,7900*,10394*,11640*,11650*,11663
    - biochemical procedures: 9371,10443*,10525*,10529,10531
    - biopsy: 2554,10519*,10531
    - radiology: 10518*
      - angiography: 5290*,8409
      - lymphography: 4310*
  - epidemiology: 2541*,5297*,5310,7237*,10391*,10520*,11668
  - etiology: 1553*,2541*,2542*,4312*,4315*,6284*,7275,11642*,11645*
  - immunology: 1551*,2533*,2534*,2540*,2543,2546,4315*,5298*,5300*,6284*,6287,7292*,7293*,8402,9364*,10521*,10522*,10525*,11642*,11645*,11648*,11657
  - metabolic changes: 1559,5293*,5299*,5300*,7212*,7900*,8406,10524*
  - microorganisms: 573*,7304,11658,11666,11667
- ULCERATIVE COLITIS (Contd.)
  - pathology: 2533*,2535*,2537*,2542*,2544,2553,2554,3382*,4310*,4319,4323,5290*,5292*,5298*,5302*,5307,7237*,8399*,9367,10430*,10519*,10524*,10533,11511*,11540*,11642*,11650*,11655,11664
  - psychologic studies: 657*,658*,660,661,664,1553*,2545,2546,3390,8408,11645*,11648*,11649*
  - treatment: 661,2533*,2534*,3384,3385,3387,4321,4322,5309,5311,6283*,7304,9367,9369,10528,10530
    - medical: 1549*,1556,1557,3383*,4317,5291,5295,5301,6282*,6288,8399*,8407,10430*,10519*,10522*,11640*,11641*,11643*,11644*,11665
    - surgical: 1556,1558,1560,2370*,2539*,3386,3388,3389,4313*,4314*,4316,4318,5243*,5287,5294*,5296*,5305,6291,7212*,7299,8355*,8406,9365*,9368,10430*,10518*,10519*,10520*,10523*,10526,10527,10532,10534,10535,11511*,11540*,11646*,11648*,11661,11662

- VITAMINS (see also Absorption; Malabsorption: Liver): 5927,7487,7491,7535,9708,11821
  - A: 1781,2630*,4808,5053,5478*,6149*,6797,8836,10267*,10931
  - B complex: 11*,717*,1109*,1144,1145,1738*,1748,1749,1751,2038*,2719*,3003,3649*,4474,4740*,4811,5468*,5807*,5824,5855,5861,6146*,6148*,6462*,6758,6771*,6777*,6784,6785,6824,6896,7035*,7490,7531,7532,7605,7663,7775*,7953,7954,8184*,8541*,8579,8599,8734,8831*,8961,9214*,9568*,9758,9860*,9879,9922,10411*,10590*,10710,10756,11136,11755*,11784,11848*,11935*
  - B_{12}: 101*,1337*,1415*,1907*,1996*,2296*,2335,2458,2911,3036*,3746*,4415,4731*,4732*,5204*,5227,5721*,6053*,6211*,6699*,6701*,7816*,7953,8179*,8184*,8212,8246*,8339,8398*,8584*,8764*,8765*,8766*,9118,9747*,9800*,9832*,10251,10261*,10411*,10968*,11024*,11319*
  - D: 1949*,2903*,3651,4695,5053,6663*,6683*,6714*,7714*,7743*,7744*,7979,8739
  - E: 1781,2046*,4459*,5028*,5106*,5203*,6148*,6149*,9999*,11846*,11859*
  - folic acid: 7485,7490,7605,10411*
  - K: 7121*,7584*
- VOLVULUS (see also specific organ): 6132
- VOMITING: 215,1176,1210,2112,2222,2960*,3173*,3776*,3917*,3919*,4887,4974*,5909,6061,6747*,6751*,6870,6980,7052*,7886*,8020,8030*,8127*,8244*,8287*,8296*,8636*,8906*,8949*,9019*,9056*,9062*,9080*,9087*,9298*,9542,9577*,9766*,10092*,10146*,10262*,10399*,10433*,10436*,11073*,11171,11172,11280*,11291,11401*,11698*

IPPLE'S DISEASE: 575*,1479*,1484,1491, 2454,3322,5214*,5241*,8343,8344,8345,9284, 10410*,10414,10415,10416,11065*
LSON'S DISEASE (see Hepatolenticular degeneration)

LLINGER-ELLISON SYNDROME: 257*,258*,304,

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